THE MARINE MOLLUSCA OF THE TRUCIAL COAST, PERSIAN GULF

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THE MARINE MOLLUSCA OF THE TRUCIAL COAST, PERSIAN GULF

By H. E. J. BIGGS

INTRODUCTION

This report on the Mollusca of the Trucial coast, at the southern end of the Persian Gulf, is based on a collection made by a team of geomorphologists from the Imperial College of Science and Technology, London led by Dr G. Evans. One hundred and ninety eight species are recorded including many new records for the Persian Gulf; five new species are described.

Little has been written on the Mollusca of the Trucial Coast although there is a considerable literature on the Persian Gulf. Melvill and Standen (1901, 1907) and Melvill (1928) record a total of 1618 species for the Persian Gulf, but only 32 of these are recorded for the southern coasts and these are all from Dubai. Haas (1952) records 40 species for the area based on the 1950 Peabody Museum Harvard Expedition to the Near-East which visited Dubai and Sharja; this list was expanded by Haas (1954), to include 64 species for the same area. For a more complete bibliography of the Persian Gulf than given in this work reference should be made to Melvill and Standen (1901, 1907) and Melvill (1928).

In this work the Persian Gulf refers to that area bounded by the 150 m depth contour at the northern end of the Gulf of Oman. As the stations in the Khor-al-Bazm were so numerous they are reported here as Eastern Khor, for material collected by Dr Sir Patrick d'E. Skipwith at 75 stations, and as Western Khor for that collected by Dr C. G. St. C. Kendall at 73 stations. For the list of species collected at each station see Biggs (unpublished MS) in the Library of the British Museum (Natural History).

The synonymies are restricted to records of the species in the Persian Gulf, south Arabia coast and Red Sea areas. Unannotated lists e.g. Shopland (1902) for Aden and Cooke (1885–6) for Suez Bay have not been cited unless more detailed records are unavailable. As Haas (1952, 1954) reports on the same area as this work reference is made to those lists. The identifications of all records placed in synonymy were not verified, the work of the authors cited is accepted unless otherwise stated.

Only some of the ecological data collected by Dr Evans and his team has been incorporated in this work, for more detailed information reference should be made to Kendall (1966), Kinsman (1964b) and Skipwith (1966). Photographs taken by members of the team in the region near Abu Dabi are included.

The majority of molluscs were collected dead and are worn but some specimens were collected live and preserved, where relevant the gross anatomy of such specimens has been figured. Unless otherwise indicated the material listed are adult specimens collected dead. The collection on which this work is based has been deposited in the Zoology Department of the British Museum (Natural History).

THE TRUCIAL COAST

Contributed by Dr Graham Evans

The Trucial Coast forms the southern seaboard of the Persian Gulf from the Mussandam peninsular in the east to the base of the Qatar peninsular in the west. It is a low coastline bordered by numerous low islands and shallow banks which enclose shallow lagoons for much of its length (Evans, Kinsman, Sherman 1964), considerable geomorphological and sedimentological detail is contained in a series of unpublished theses of London University by Kinsman (1964), Skipwith (1966) and Kendall (1966). Inland is a narrow coastal plain which passes landwards in the west and central parts into the extensive desert area of the Rub-el-Khali. In the extreme east the coastal beaches and dunes are backed by outwash plains cloaked with dunes which run up to the foot of the Oman Mountains, and lagoons are less common. The coastline is composed almost entirely of Quaternary sediments which are usually unconsolidated but are sometimes cemented to form a friable rock. These sediments are composed almost exclusively of calcium carbonate produced by chemical and biochemical precipitation add breakdown as no freshwater drainage reached the area and there is no supply of sediment to the coast or open waters of the Gulf in this area except for some wind carried material. In a few localities low hills of Tertiary rocks form small scattered headlands.

Off shore there is a wide shallow marine area—the Great Pearl Banks—where the bottom rarely exceeds 120 ft. Low islands and banks rise from this shallow sea floor. These off shore islands are mostly salt plugs and show a great variety of rock types and they are often surrounded by soft Quaternary sediments. Coral is some-

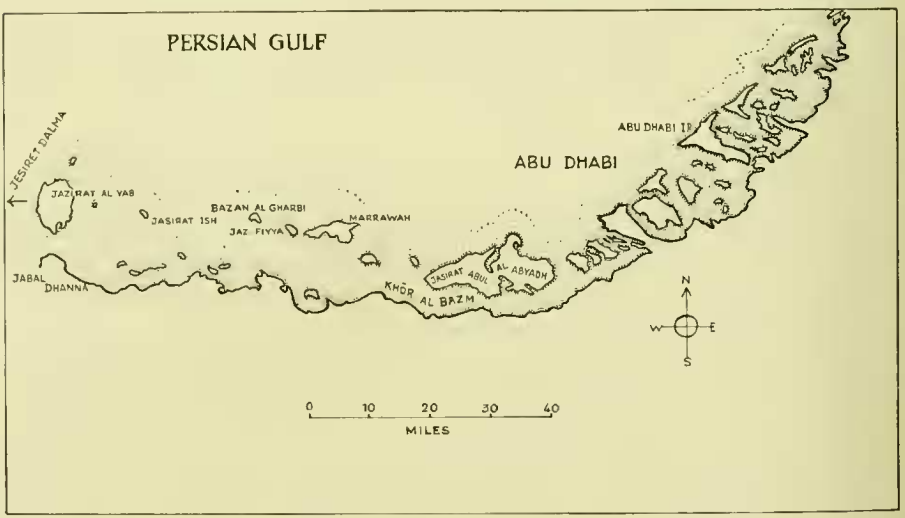

FIG. 1. Persian Gulf.

times found capping the banks and fringing the islands. The general Geology, Physiography and Oceanography of the area has been reviewed by Evans (1966).

The Persian Gulf is an area of unusually high temperatures and salinities. The temperatures range from 23°–32°C. in the Straits of Hormuz to 16°–32°C. at the head of the Gulf. The salinity ranges from 37‰–38‰ at the entrance to the Gulf and 38‰–41‰ at the north west end. Temperature and salinities are particularly high in the inshore area around the Trucial Coast, where there is no fresh water inflow and rainfall is only a few inches a year. Salinities range from 42‰–44·5‰ in the nearshore waters and 53·6‰–66·9‰ in the inner lagoons. Water temperatures range from 23°C.–34°C., in the coastal waters, to 22°C.–36°C. in the inner lagoons. In water pools on the exposed algal flats the temperature and salinities reach greater extremes (e.g. 77·4‰ at 36°C.). Large diurnal variations in temperatures are found in the lagoonal area.

The principal wind is the 'Shamal' which blows from the north west and consequently the wave attack is also from the north west. A diurnal on-off shore system also exists. Tidal ranges are low (7 ft. approx. max.) in the nearshore waters and are even lower in the lagoons (approx. 3 ft.). Strong inshore winds may, however, raise the nearshore waters to several feet above their normal level and then flood the coastal plains. Tidal and other currents are generally weak except in the inlets leading into the lagoons where surface waters may reach speeds of 2 ft./sec.

The low islands and banks bordering the coast form a low barrier which parallels the coastline and protects a large lagoon—the Khor-al-Bazm—in the west of the area. In the eastern part however the islands are orientated mainly perpendicularly to the coastline and almost reach the mainland in many places. The lagoons in this part are thus a series of small enclosed water bodies.

The islands are fronted by sandy beaches and dunes. In some places small corals have colonized the sea floor in front of the islands and have developed small barrier reefs which enclose small mud filled lagoons; in other cases the corals have built up fringing reefs on the fronts of the islands and banks particularly in the west (to form fringing reefs). Where the waters from the lagoons gain access to the shallow southern Persian Gulf large tidal deltas have formed to produce wide shoal areas stretching up to a mile off shore. These deltas are covered by calcareous sands and often have wide areas of weed growing on them, particularly where rocky floors exist. These are only covered by about 6 ft. of water at low water. Elsewhere the sea floor deepens fairly sharply in front of the islands to an average depth of 24 ft.–30 ft.

Seaward of the tidal deltas and fronts of the islands the floor of the southern Persian Gulf is very shallow. It is covered by sand and muddy sand with the finer grained sediments occupying the depressions. Again the sediment is composed almost entirely of $CaCO_3$. Seagrasses and weed are sometimes found growing on the floor.

In the east of the area large tidal channels up to 40 ft. deep run back into the lagoons and eventually die out as traced towards the mainland. They separate shallow banks from the islands and are bounded by broad shallow terraces where the water depths rarely exceed 4 ft.–6 ft., patches of weed are often found in the

channels and at scattered localities where rock is exposed on the terraces. Coral is found developing small reefs on the outer parts of the lagoons on the sides and in some places on the floor of the channels, but it never extends far into the lagoons. Elsewhere the floor of the channels are covered with coarse gravelly calcareous sand, and sometimes Quaternary limestone is exposed. However at their landward ends the channels may be filled with muddy sand and mud. In the Khor-al-Bazm a large area of calcareous mud is found behind the shelter of the coastal barrier.

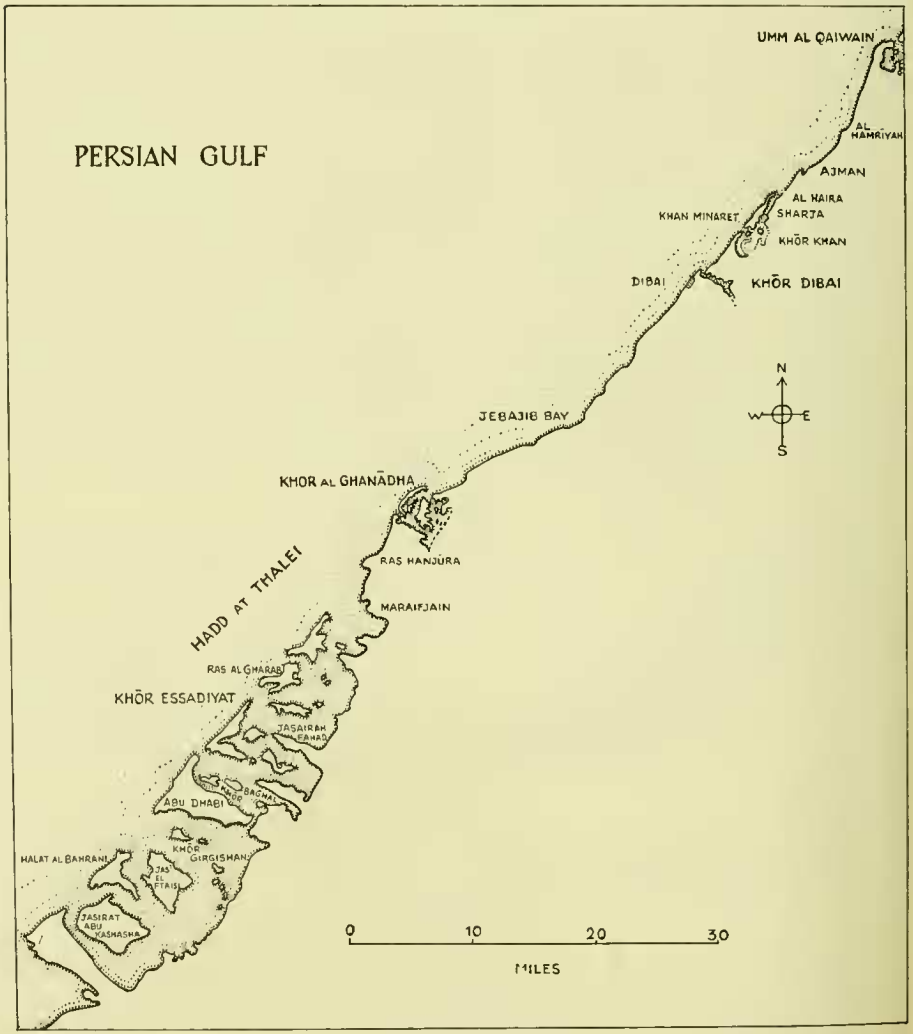

FIG. 2. Persian Gulf.

The terraces are covered with calcareous, slightly muddy sand or, more rarely calcareous sandy mud, and again bare rock is sometimes exposed. In places Quaternary limestones form small rocky islands in the lagoons and these provide hard rocky shores. Elsewhere the islands and mainland shores are fringed with narrow beach and dune ridges, and broad intertidal flats. These are sometimes colonised by blue-green algae, particularly along the mainland shore and the algal flats are often up to half a mile across. Extensive Mangrove swamps (*Avicennia marina* Førsskål) occur fringing the islands and mainland (Plate 1, fig. 2) in some lagoons. The beach ridges and intertidal flats bordering the mainland shore pass into a wide low coastal plain—the sabkha. Its outer part is made up of old beach ridges and intertidal features which are now stranded far from the sea. This outer part of the plain has developed by extensive intertidal flat and beach ridge accretion in the same way that salt-marsh areas grew in more temperate latitudes. (Evans, Kendall and Skipwith, 1964).

The samples described were collected by a team of geologists led by Dr Graham Evans from the Imperial College, London. It included D. J. J. Kinsman, C. G. St. C. Kendall, and Sir Patrick A. d'E. Skipwith. The main collections were made between October 1961 and December 1965. Most of the collections were made on the beaches, intertidal flats, lagoons and near-shore zones by hand or by using a small grab. In addition some samples (designation Gh.) were collected with a grab from the deeper water areas off the Trucial Coast. When living organisms were encountered they were immediately preserved in alcohol and transported back to England in that state. In other cases lone shells were collected. This study is part of a much larger programme. The sediments are being studied at the Department of Geology, Imperial College, and have already been reported on in some theses and a few preliminary publications. The ostracods of the area are being studied by Dr R. Bate, British Museum (Natural History) and foraminifera collected in the samples are being studied by Dr J. R. Murray, Bristol University. Various other groups have been described by members of the Museum staff.

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G.E.

CLASS *LORICATA*

Order CHITONIDEA

Family **ISHNOCHITONIDAE**

Genus ***ISCHNOCHITON*** Gray, 1847

Ishnochiton yerburyi Smith, 1891

I. yerburyi Smith, 1891 : 420, pl. 33, fig. 6.

MATERIAL. Sta. 102, 1 live.

This juvenile was found attached to *Pinna atropurpurea* Sowerby from the intertidal zone near the north cape of Abu Dhabi I. This is the first record of this species

from the Persian Gulf. It was described by Smith from Aden and is similar to specimens collected by Winckworth at Manora, Karachi and now in the B.M.(N.H.).

CLASS *GASTROPODA*

Sub Class *PROSOBRANCHIA*

Superfamily **PLEUROTOMARIACEA**

Family **FISSURELLIDAE**

Genus ***EMARGINULA*** Lamarck, 1801

Emarginula planulata A. Adams, 1853

(Plate 2, figs 1, 2)

E. planulata A. Adams, 1853 : 86. Reeve, 1873 : *19*, sp. 20.

MATERIAL. Sta. 98, 1 live, B.M.(N.H.) Reg. No. 1968751.

This is a new record for the Persian Gulf. The shell is 11·5 mm long 7·2 mm broad and 3·4 mm high. The upperside is flesh-pink except for the apex which is yellowish; there are 47 radial ridges ornamented with closely placed imbrications, the ridges are alternately high and low, at the posterior end they are almost equal in height and at the anterior end the contrast in height is very marked. The inner side is thickened in the central part, rather dark yellow where the animal is attached; edges pale pink; area round the siphonal split thickened by the accretion of shelly matter, whitish. The inner edge of the shell is crenulate. Apex of the shell yellowish, very recurved, situated a little anterior to the median line. The fissure is narrow, extending to about halfway between the edge of the shell and the apex but after that it continues as a furrow to the apex where it disappears. Round the outer edge of the shell and on the upper side is a line which marks the limit of the overlap of the mantle.

The animal is deep crimson in colour throughout; the shell is somewhat buried in the mantle. Foot length 12·0 mm, breadth 10·0 mm. The mantle, which is irregularly serrate overlaps the shell about 1·5 mm. These measurements are based on an animal which has been in alcohol for some time.

The type series of 4 specimens in the B.M.(N.H.) have no locality but are from coarse sand and shells, 7 fms. Adams (1853) gives Singapore as the locality while Reeve (1873) gives the Philippines. The specimen figured is here selected lectotype (B.M.(N.H.) Reg. No. 196616/1). The differences between the types and the specimen here recorded are probably due to the former being worn.

A juvenile specimen from the Maldive Is. collected by Gardiner and a specimen from Port Blair, Nicobar I. were also examined.

Genus ***DIODORA*** Gray, 1821

Diodora funiculata (Reeve, 1850)

Fissurella funiculata Reeve, 1850, *19* : Sp. 65.
Glyphis funiculata Melvill and Standen, 1901 : 344.
D. funiculata Haas, 1952 : 115. Haas 1954 : 46. Biggs, 1958 : 271. Biggs and Grantier, 1960 : 387.

MATERIAL. Sta. 50, 1; Sta. 70A, 1 juvenile; Western Khor, 1 juvenile; Unlocated, 1 live.

Diodora imbricata (Sowerby, 1862)

Fissurella imbricata Sowerby, 1862 : 194, pl. 242, fig. 162.

MATERIAL. Sta. 12, 1 live, juvenile.

This is the first record of this species from the Persian Gulf. No locality is given for the type, the only other specimen examined was a juvenile from Karachi collected by Winckworth.

Superfamily **TROCHACEA**

Family **TROCHIDAE**

Genus ***EUCHELUS*** Philippi, 1847

Euchelus angulatus Pease, 1867

E. angulatus Pease, 1867 : 283, pl. 23, fig. 27.
E. foveolatus angulatus Melvill and Standen, 1901 : 350.

MATERIAL. Western Khor, 1.

Melvill and Standen (1901) record this species from Charbar, Makran Coast and Angas Bank, India. In the collection of the B.M.(N.H.) there are two specimens from Jask, Persian Gulf.

Euchelus asper (Gmelin, 1791)

Trochus asper Gmelin, 1791 : 3583
E. asper Melvill and Standen, 1901 : 350. Biggs, 1958 : 271. Biggs and Grantier, 1960 : 387.

This species is recorded as common by Kinsman (1964b) for the reef of the Trucial Coast, by Melvill and Standen (1901) for Karachi where it occurs 'amongst muddy rocks at low tide', by Biggs and Grantier (1960) for Ras Tanura and Biggs (1958) for Hormuz I. Haas (1952, 1954) does not record the species for the Trucial coast.

Euchelus bicinctus (Philippi, 1849)

Trochus (*Phorus*) *bicinctus* Philippi, 1849 : 102. Issel, 1869 : 226, 328.
E. bicinctus Tomlin, 1927 : 298. Moazzo, 1939 : 207.

Material. Eastern Khor, 9; Western Khor, 4.

Although not recorded by Melvill and Standen there are specimens in the B.M.(N.H.) collected on the Makran Coast in 3–7 fms. Moazzo (1939) reported the species in the Suez Canal as far north as Lake Timsah.

Genus *TURCICA* A. Adams, 1854

Sub-genus *PERRINIA* H. & A. Adams, 1863

Turcica (*Perrinia*) *stellata* A. Adams, 1863

T. stellata A. Adams, 1863 : 508.
T. (*P.*) *stellata* Melvill and Standen, 1901 : 301.

Material. Eastern Khor, 9 dead from 8 Stations; Western Khor, 19 dead from 12 Stations.

The above specimens are all much smaller than the type, which is from the 'China Sea', but this is not unusual for populations living in the warmer and more saline waters of the Persian Gulf. Melvill and Standen (1901) record the species from Charbar on the Makran Coast (dead shells), the Gulf of Oman (live in 15 fms.), Dabai on pearl oysters.

Moazzo (1939) includes the species in his synonym of *Tectarius armatus* Issel under Littorinidae.

There is doubt about the authenticity of the type locality for this species, Tomlin has written on the type specimen tablet, 'Prob. from Gulf of Suez'. Certainly the existence of this species in Chinese waters needs confirmation.

Genus *TROCHUS* Linnaeus, 1758

Sub-genus *INFUNDIBULOPS* Pilsbry, 1889

Trochus (*Infundibulops*) *erythraeus* Brocchi, 1821

T. erithreus Brocchi, 1821 : 223.
T. (*I*) *erythraeus* Sturany, 1901 : 265. Tomlin, 1927 : 298.

Material. Sta. 12, 1; Sta. 9, 1; Eastern Khor, 1; Beach, 22.

A very common species in the area. Kinsman (1964b) reports that it is common on the off shore shelf.

Genus ***GIBBULA*** Risso, 1826

Sub-genus ***ENIDA*** A. Adams, 1860

Gibbula (Enida) townsendi Sowerby, 1895

G. (E) townsendi Sowerby, 1895 : 279, pl. 18, figs 7–9. Melvill and Standen, 1901 : 349.

MATERIAL. Western Khor, 2 juveniles.

This is a new record for the Persian Gulf as the specimens of Melvill and Standen (1901) are from the Makran Coast, the type locality. The species has not been recorded for the Red Sea but I have specimens collected by Mr W. Reed, from Dongonab Bay, north of Port Sudan.

Genus ***MINOLIA*** A. Adams, 1860

Minolia gradata Sowerby, 1895

M. gradata Sowerby, 1895 : 279, pl. 18, figs 5 and 6. Melvill, 1928 : 97. Sturany, 1903 : 265

MATERIAL. Eastern Khor, 4; Western Khor, 3.

Minolia holdsworthiana (G. & H. Nevill, 1871)

Gibbula holdsworthiana Nevill G. and H., 1871 : 3, pl. 1, fig. 18.
M. (Conotrochus) holdworthiana Melvill and Standen, 1901 : 350.
M. holdsworthiana Melvill, 1928 : 97.

MATERIAL. Eastern Khor, 11 from 5 stations; Western Khor, 31 from 10 stations.

As Melvill (1928) states that his (1901) record was in error for *Minolia variabilis* A. Adams, this may be considered as the first record for the Persian Gulf.

Minolia variabilis A. Adams, 1873

M. variabilis A. Adams, 1873 : 207, pl. 23, fig. 10. Melvill, 1928 : 97.
M. holdsworthiana (in error) Melvill and Standen, 1901 : 350.

MATERIAL. Western Khor, 2.

Melvill (1928) records this species from Reshire, Gulf of Oman (abundant), Karachi (in mud, 3 to 7 fms). It is possible that the *Margarita variabilis* A. Adams listed by Shopland for Aden is this species.

Genus ***MONILEA*** Swainson, 1840

Sub-genus ***PRIOTROCHUS*** Fischer in Kiener, 1879

Monila (Priotrochus) obscura (Wood, 1828)

Trochus obscurus Wood, 1828 : pl. 5, fig. 26. Issel, 1866 : 409.
M. (P) obscura Moazzo, 1939 : 208.
Cantharidus kotschii (in error) Biggs, 1958 : 271. Biggs and Grantier, 1960 : 387.

MATERIAL. Sta. 36, 10; Sta. 49, 7; Sta. 59, 13, 6 live; Sta. 60, 7; Sta. 61, 4 live; Sta. 63, 13; Sta. 64, 1; Sta. 68, 15 live; Sta. 92, 4 live; Eastern Khor 79; Western Khor, 50.

A common intertidal species. It is evident from the material studied (including some from Kuwait) that there is considerable variation in size, shape and markings of the shell of *obscura* and the South African specimens may be an extreme form of this species.

Genus ***UMBONIUM*** Link, 1807

Umbonium vestiarium (Linnaeus, 1758)

Trochus vestiarius Linnaeus, 1758 : 758.
Rotella vestiaria Issel, 1866 : 410.
U. vestiarium Fischer, 1891 : 227. Melvill and Standen, 1901 : 351. Biggs, 1958 : 271. Biggs and Grantier, 1960 : 387.

MATERIAL. Sta. 70, many; unlocated 3; Eastern Khor, 1; Western Khor, 3.

Family **CYCLOSTREMATIDAE**

Genus ***CYCLOSTREMA*** Marryat, 1818

Cyclostrema quadricarinatum Melvill and Standen, 1901

C. quadricarinatum Melvill and Standen, 1901 : 346, pl. 22, fig. 2.

MATERIAL. Western Khor, 8.

This is a new record for the Persian Gulf, the species was described from the Gulf of Oman, in 225 fms. on sand and mud. The present record is from the intertidal.

Family **TURBINIDAE**

Genus ***TURBO***

Turbo coronatus Gmelin, 1791

T. coronatus Gmelin, 1791 : 3594. Melvill and Standen, 1901 : 352. Haas, 1952 : 115. Biggs, 1958 : 272. Biggs and Grantier, 1960 : 388.

MATERIAL. Sta. 27, 8 live; Sta. 53, 3 live; Sta. 63, 17 live; Sta. 68, 3 live; Sta. 70, 3; Sta. 86, 5 live juveniles; Sta. 92, 3 live; Eastern Khor, 21; Western Khor, 7.

As reported by Kinsman (1964b) this is a common intertidal species.

Turbo radiatus Gmelin, 1791

T. radiatus Gmelin, 1791 : 3594. Moazzo, 1939 : 200. Biggs and Grantier, 1960 : 387.
T. Chemnitzianus Sturany, 1903 : 78, 264.

MATERIAL. Eastern Khor 13 + 3 live.

The live specimens were from a coral bank in the Middle of the Khor-al-Bazm.

Genus *TRICOLIA* Risso, 1826

Tricolia fordiana (Pilsbry, 1888)

Phasianella fordiana Pilsbry, 1888 : 173.
P. elachista Melvill and Standen, 1901 : 351.

MATERIAL. Western Khor, 49.

The species is common at the Western end of the Khor-al-Bazm but unrecorded in the eastern end of the Khor. I am indebted to Dr Robert Robertson, of Philadelphia, for pointing out the identity of Melvill's species with one previously described by Pilsbry.

Genus *PHASIANELLA* Lamarck, 1804

Phasianella solida (Born 1778)

Helix solida Born 1778 : 408.
P. nivosa Reeve, 1862, *13* : sp. 8.
P. variegata nivosa Melvill and Standen, 1901 : 352.

MATERIAL. Sta. 39, 2 live, 1 juvenile; Eastern Khor, 8; Western Khor, 3; unlocated, 2.

Melvill and Standen (1901) record this species for the Makran Coast and Karachi, 'usually found from 3 to 7 fms, sand and mud'. This is a new record for the Persian Gulf, it appears to be fairly common.

Superfamily **NERITACEA**

Family **NERITIDAE**

Genus *SMARAGDIA* Issel, 1869

Smaragdia rangiana (Récluz, 1841)

Nerita rangiana Récluz, 1841 : 339.
N. (*S.*) *rangiana* Sturany, 1903 : 264.
S. rangiana Barnard, 1963b : 204.

MATERIAL. Eastern Khor 6; Western Khor, 6.

This is the first record of this species in the Persian Gulf.

Superfamily **NERITACEA**

Family **PHENACOLEPADIDAE**

Genus ***PHENACOLEPAS*** Pilsbry, 1891

Phenacolepas evansi n. sp.

(Pl. 2, figs 3, 4)

Shell white, semitransparent, broadly oval, rather flat; apex small, bulbuous, smooth, inclined posteriorly but not projecting over the margin of the shell; ribs radiate from the apex, increasing in size towards margin, ribs with flat imbrications increasing towards the margin; interspaces with fine concentric striations, these are continuous over ribs between striations; margin slightly crenulate; interior of shell white, striated, the muscle scar is rounded at the anterior and posterior ends but deeply indented laterally.

Type material. Holotype B.M.(N.H.) Reg. No. 1968757 Western end, Khor-al-Bazm, Oman. Length 5·6 mm, width 4·7 mm, height 2·0 mm.

Paratype A B.M.(N.H.) Reg. No. 1968758 Western end Khor-al-Bazm. Length 6·1 mm, width 5·7 mm, height 2·3 mm.

Paratype B B.M.(N.H.) Reg. No. 1968759, Sta. 58. Length 7·4 mm, width 6·8 mm, height 2·7 mm.

Compared with *Phenacolepas granocostata* (Pease) which appears to be its nearest relative this species is (a) flatter and broader, (b) with radial ribs higher and imbricate, (c) the apex is not so arched and does not protrude over the posterior end of the shells as in *granocostata*.

The species is named in honour of Dr Graham Evans as an acknowledgement of his careful collecting of mollusca and on whose work this paper is based.

Phenacolepas omanensis n. sp.

(Pl. 2, figs 5, 6)

Shell white, thin, ovate; apex sub-central, inclined posteriorly but not overlapping the posterior end of the shell; protoconch globular, smooth, nipple-like, distinctly separated from the rest of the shell by a growth-line; surface of shell generally irregularly imbricated in latitudinal rows which are denser towards the edge of the shell; interior white, porcellaneous, with a thickened fold or ridge parallel to the edge of the shell and situated posteriorly fading out as it reaches the sides; muscle-scar distinct, entire with two distinct lobes on each side separated by a sinus, rim of shell somewhat crenulate.

Type material. Holotype B.M.(N.H.) Reg. No. 1968755, Sta. 101 live. Length 8·2 mm, width 7·0 mm, height 2·8 mm.

Paratype B.M.(N.H.) Reg. No. 1968756, Sta. 101 live. Length 8·5 mm, width 7·0 mm, height 2·9 mm.

The chief feature which separates this proposed new species from *evansi* n.sp is the fact that the imbrications are not placed regularly and are not on longitudinal ridges as in *evansi*.

This is the first record of the genus *Phenacolepas* in the Persian Gulf and after examination of further material it may be necessary to separate them under a new sub-generic name.

Superfamily **LITTORINACEA**

Family **LITTORINIDAE**

Genus ***NODILITTORINA*** v. Martens 1897

Nodilittorina subnodosa (Philippi 1847)

Tectarius subnodosa Philippi, 1847 : 161, pl. 3, fig 8, 9. Moazzo 1939 : 183.
Littorina subnodosa Cooke, 1885b : 269. Issel, 1869 : 191.

MATERIAL. Sta. 57, 16 live; Sta. 61, 10 live; Sta. 68, 2 live; Sta. 72, 275 live; Sta. 73, 7 live; Sta. 75A, 45 live; Sta. 92, 3 live; Sta. 99, 6 live; Eastern Khor 3; Western Khor, 1.

This species is generally found on intertidal flats which have a substrate of muddy sand, but in one case it was in the high intertidal zone with blue-green algal flat as substrate. The salinity was about 42‰ and the temperature ranged from 22°C. in December to 33°C. in July/August. However one locality, Station 73, in the outer lagoon near Abu Dhabi I. had a salinity of 50·05‰ in July/August 1966 with a temperature of 34°C. (= about 93°F.) at the same time of the year.

The colour of the specimens was generally a dull gray-green, possibly due to corrosion. In order to ascertain the actual colours a number of specimens from Sta. 57 and Sta. 73 have been washed in 10% HCl to remove the encrustations and variable colour patterns have been revealed ranging from uniform dark brown (occasionally almost black), banded (brown with white bands, white with brown bands, white or black with orange bands) to entirely orange.

Average measurements of a sample of 14 from Sta. 75A, height 12·8 mm, breadth 9·0 mm.

The specimens from Sta. 72 and Sta. 73 show a large amount of variation in sculpture, ranging from heavily noduled to almost smooth; all specimens have corrugations on the body whorl near the suture.

Specimens from the southern end of the Qatar Peninsular (collected by Illing) and from near Ras Tanura (collected by Grantier) were also examined.

Superfamily **RISSOACEA**

Family **HYDROBIIDAE**

Genus ***IRAVADIA*** Blanford, 1867

Iravadia trochlearis (Gould, 1861)

Rissoina trochlearis Gould, 1861 : 400.
I. trochlearis Melvill and Standen, 1901 : 369.

MATERIAL. Sta. 12, 2; Western Khor 9.

The specimens from Sta. 12 was in 115 feet of water which suggests the species may not be confined to littoral zones as would be inferred from former records.

Family **RISSOIDAE**

Genus ***RISSOINA***

Rissoina distans (Anton, 1839)

R. distans Anton, 1839 : 62.
R. (*Rissolina*) *distans* Melvill and Standen, 1901 : 367.

MATERIAL. Sta. 72, 2; Eastern Khor, 3.

This is a new record for the Persian Gulf, as the Melvill and Standen record of the species is for Bombay and Anton does not give a locality for the type.

Rissoina savignyi Jousseaume, 1894

R. savignyi Jousseaume, 1894 : 101.

MATERIAL. Eastern Khor, 1.

It is possible that this species is synonymous with *R. clathrata* A. Adams which is recorded by Melvill and Standen for the Persian Gulf, Makran Coast and Karachi.

Rissoina seguenziana Issel, 1869

R. sequenziana Issel, 1869 : 209. Moazzo, 1939 : 188.
R. (*Phosinella*) *seguenziana* Melvill and Standen, 1901 : 369.

MATERIAL. Sta. 70, 1.

Superfamily **CERITHIACEA**

Family **TURRITELLIDAE**

Genus ***TURRITELLA*** Lamarck, 1799

Turritella auricincta v. Martens, 1882

Turritella auricincta von Martens, 1882 : 107. Sturany, 1903 : 233. Moazzo, 1939 : 180. Tryon, 1886 : 208.

MATERIAL. Eastern Khor 17 specimens, mostly fragments; Western Khor 29 specimens, mostly fragments.

This is a new record for the Persian Gulf. Pilsbry (1886) includes the name amongst his 'unfigured, undetermined and spurious species' but gives Friendly Islands as the locality for the species. It is therefore not clear just which of the adjectives Pilsbry wished to apply to this species.

Turritella fascialis Menke, 1828

Menke, 1828 : 83.

MATERIAL. Sta. 77, 1.

A new record for the Persian Gulf; Kinsman (1964b) records the species as rare on the reef in mid-lagoon.

Family **PLANAXIDAE**

Genus ***PLANAXIS*** Lamarck, 1822

Planaxis sulcatus (Born, 1778)

Buccinum sulcatum Born, 1778 : 251.
P. sulcatus Melvill and Standen, 1901 : 377. Thorson, 1940 : 162. Biggs, 1958 : 272. Biggs and Grantier, 1960 : 388. Barnard, 1963 : 140.
P. sulcatus savignyi Sturany, 1903 : 263.

MATERIAL. Sta. 61, 13, 6 live; Sta. 68, 9; Sta. 92, 2; Western Khor, 2.

This species is widely distributed in the Indo-Pacific region. Details of its reproduction and development in the Persian Gulf have been recorded by Thorson (1940).

Family **POTOMIDIDAE**

Genus ***CERITHIDEA*** Swainson, 1840

Cerithidea cingulatus (Gmelin, 1791)

Murex cingulatus Gmelin, 1791 : 3561.
Potamides fluviatilis Fischer, 1891 : 225.
P. (*Tympanatonus*) *fluviatilis* Melvill and Standen, 1901 : 375.
C. cingulatus Haas, 1952 : 115. Haas, 1954 : 47. Biggs, 1958 : 272. Biggs and Grantier, 1960 : 388.

MATERIAL. Sta. 35, 4 juvenile; Sta. 57, 12 live; Sta. 59, 4; Sta. 60, 4; Sta. 71, 17 juvenile; Sta. 97, 2; Eastern Khor, 69; Western Khor, 6.

Both this species and *Pirenella conica* are able to flourish in the most extreme conditions. In Bundar Abbas, where the salinity is about 27‰ the species is not only abundant but of large size (Biggs, 1958), and on the opposite side of the Gulf on the Trucial Coast, it tolerates a salinity of 42‰ although the specimens are somewhat smaller. In the north of the Gulf it occurs more sparingly at Ras Tanura (Biggs and Grantier, 1960). Unfortunately I have not seen any records of the salinity in that area, but with the outflow from the Shatt-al-Arab and the Karun River it could be very much lower than either of the above two localities.

Genus ***PIRENELLA*** Gray, 1847

Pirenella conica (Blainville, 1829)

Cerithium conicum Blainville, 1829 : 158.
P. cailiaudi Potiez and Michaud, 1844 : 359.
P. conica Tomlin, 1927 : 296.
Potamides (*P.*) *conica major* Moazzo, 1939 : 176.

MATERIAL. Sta. 57, 12 live; Sta. 67, 24; Sta. 72, 25; Eastern Khor, 21; Western Khor, 13.

As with *Cerithidea cingulatus* this species can tolerate extreme conditions, those taken at Station 72 were living on muddy sand in about 6 inches of water with a salinity of 42‰. The species is also found in polluted water in Aden harbour.

Genus ***TEREBRALIA*** Swainson, 1840

Terebralia palustris (Bruguière, 1792)

Cerithium palustris Bruguière, 1792 : 486.

MATERIAL. Sta. 51, 2.

This is a new record for the Persian Gulf. Both the specimens above were dead and damaged. It seems remarkable that such a large and conspicuous species has not been recorded before and there is just the possibility these specimens may have come in with ballast.

Family **DIASTOMIDAE**

Genus ***FINELLA*** Adams, 1860

Finella pupoides (A. Adams, 1860)

Finella pupoides A. Adams, 1860 : 336.
Fenella pupoides Melvill and Standen, 1901 : 370. Taylor, 1968 : 200.

MATERIAL. Sta. 5, 27; Sta. 7, 22; Sta. 13, many; Sta. 14, 2; Sta. 77, 1; Eastern Khor, 4; Western Khor, 39.

This species is fairly common in the Persian Gulf, Melvill and Standen (1901) report it from Bushire, Dr L. V. Illing took some in both 15 and 18 metres of water off the south-east side of Qatar Peninsular (Biggs Colln.).

Finella reticulata (A. Adams, 1860)

Dunkeria reticulata A. Adams, 1860a : 422.
Fenella reticulata A. Adams, 1864 : 40. Tryon, 1887, 9 : 395. Melvill and Standen, 1901 : 370.

MATERIAL. Western Khor, 9.

This species is extremely variable, Tryon (1887) places it in the synonymy of *O. scabra*, A. Adams; he figures *O. reticulata*. Even in the small sample from the Khor-al-Bazm there is much variation and two of them are extremely tall as compared with the others.

Finella scabra (A. Adams, 1860)

Dunkeria scabra A. Adams, 1860a : 421.
Fenella scabra A. Adams, 1864 : 40. Taylor, 1868 : 200.
Finella scabra Tryon, 1887, 9 : 395.

MATERIAL. Sta. 5, 10. Sta. 7, many; Eastern Khor, 6; Western Khor, 51.

This is a new record for the Persian Gulf.

Genus ***SCALIOLA*** A. Adams, 1860

Scaliola arenosa A. Adams, 1862

S. arenosa A. Adams, 1862 : 421. Melvill and Standen, 1901 : 370. Taylor, 1968 : 200.

MATERIAL. Sta. 7, many; Sta. 14, many; Sta. 62, 4; Eastern Khor, 1; Western Khor, 30.

This species is the commonest of the genus in the material from the Trucial Coast. It is a new record for the Gulf as Melvill and Standen (1901) record it from Karachi and Bombay.

Scaliola bella A. Adams, 1860

S. bella A. Adams, 1860 : 120.

MATERIAL. Sta. 12, 1; Western Khor, 2.

New record for the Persian Gulf.

Scaliola elata Issel, 1869

S. elata Issel, 1869 : 198. Melvill and Standen, 1901 : 370. Moazzo, 1939 : 190.

MATERIAL. Western Khor, 2.

Writing of this and the two former species Melvill and Standen write 'with *Dialae*, *Fenellae*, &c. in much profusion, and appearing to be a small variety'. On the Trucial Coast the same observation applies.

Genus *DIALA* A. Adams, 1861

Diala semistriata (Philippi, 1849)

Rissoa semistriata Philippi, 1849 : 34.
Alaba semistriata Issel, 1869 : 207. Moazzo, 1939 : 184.
Litiopa (*Diala*) *semistriata* Melvill and Standen, 1901 : 371. Sturany, 1903 : 263.
D. semistriata Tomlin, 1924 : 297.

MATERIAL. Western Khor, 53.

Melvill and Standen (1901) record this species from Muskat in the Gulf of Oman and for Bombay, so this is the first record of the species for the Persian Gulf. According to Moazzo (1939) and other writers on the Suez Canal fauna, this species had penetrated the Canal as far as Lake Timsah by 1939.

Diala cf. *hardyi* Melvill, 1895

D. cf. hardyi Melvill, 1895 : 118.

MATERIAL. Western Khor, 9.

This identification is tentative as I have not examined the type and a conclusive identification was not possible from the original description and figure.

Genus *BITTIUM* Leach in Gray, 1847

Bittium (*Bittium*) *caudatum* Melvill, 1904

B. caudatum Melvill, 1904 : 161, pl. 10, fig. 8.

MATERIAL. Western Khor, 1.

Unfortunately the above specimen is damaged and the attenuated top of the shell, a character of the species (Melvill, 1904) had been lost.

Genus *CERITHIUM*

Cerithium caeruleum Sowerby, 1855

C. caeruleum Sowerby, 1855 : 866, pl. 179, fig. 61, 62. Issel, 1869 : 147. Melvill and Standen, 1901 : 373. Sturany, 1903 : 261. Moazzo, 1939 : 170. Barnard, 1963 : 132.

MATERIAL. Sta. 92, 2 live, Sta. 93, 1 live.

Cerithium petrosum (Wood, 1828)

Strombus petrosum Wood, 1828 : 34.
C. petrosum Sturany, 1901 : 261. Biggs, 1958 : 272.

MATERIAL. Sta. 36, 1; Sta. 61, 7; Sta. 70, 100; Eastern Khor, 15; Western Khor, 48.

I have separated this species from the following on grounds of general shape and ornamentation which I consider valid specific differences. Cooke (1885b : 44) states that *Cerithium petrosum* Wood is 'quite indistinguishable from *rugosum* Wood, in which species *petrosum* must be merged'.

Cerithium rugosum (Wood, 1828)

Strombus rugosum Wood, 1828 : 34.
C. rugosum Tomlin, 1924 : 295. Melvill and Standen, 1928 : 101.

MATERIAL. Sta. 36, 1; Sta. 60, 2; Sta. 62, 10; Sta. 63, 19; Sta. 64, 5; Sta. 86, 2, juvenile; Sta. 92, 1 live juvenile; Western Khor, 18.

Cerithium scabridum Philippi, 1848

C. scabridum Philippi, 1848 : 23. Cooke, 1885b : 42. Melvill and Standen, 1901 : 374. Sturany, 1903 : 260. Tomlin, 1924 : 295. Biggs, 1958 : 273.
C. yerburyi Smith, 1891 : 417, pl. 33, fig. 4. Moazzo, 1939 : 174.
C. (*Vulgocerithium*) *scabridum* Pallary, 1912 : 110.
C. (*Thericium*) *scabridum* Moazzo, 1939 : 173.

MATERIAL. Sta. 92, 1 live; Sta. 30, 57 juvenile; Sta. 50, 1 juvenile; Sta. 54, 3 juvenile; Sta. 63, 11; Sta. 67a, 4 live, 19 juvenile; Eastern Khor, 159 from 31 Sta.; Western Khor 342 from 20 Sta. 1 live; unlocated 5.

This is a common species and, with the two preceeding species, probably makes up the bulk of the geological formations now being laid down along the Trucial Coast.

It is a very variable species, Smith (1891) has named the Aden form *C. yerburyi* and Cooke (1885b : 42) has put *C. ruppelli* Philippi, into the synonymy.

The species appears able to tolerate high temperature and salinity; Kinsman (1964b) records it as very common on the shelf, in mid-lagoon, inner lagoon, tidal creeks and algal mats. According to Moazzo (1939) the species has penetrated the Suez Canal to Port Said but Pallary (1912) states 'L'éspèce remonte sur les côtes de la Syrie jusqu'à Jaffa'. One would like evidence that these were live specimens

in view of the fact that the current flows past the Egyptian delta and up the coast of Israel and so dead shells might have been carried by it and deposited at Haifa; a not unusual happening.

Cerithium sp.

A sample from the Western Khor (Tr. B2) must be left as belonging to the *rugosum-petrosum* species complex as I have been unable to assign them to either species.

Genus *CLAVA* Martyn, 1784

Clava (*Clava*) *fasciata* (Bruguière, 1792)

Cerithium fasciatum Bruguière, 1792 : 474.
Cerithium (*Vertagus*) *fasciatum* Melvill and Standen, 1901 : 374.
Clava (*Clava*) *fasciata* Haas, 1954 : 47.

MATERIAL. Western Khor, 2 live; Sta. 70, 3.

It is interesting to note that the specimens recorded by Melvill and Standen (1901) are from Muskat, dredged in 10–15 fathoms on muddy sand, whilst the two from Khor-al-Bazam are from the middle of a coral reef.

Clava (*Clava*) *kochi* (Philippi, 1848)

Cerithium kochi Philippi, 1848 : 21.
Cerithium (*Vertagus*) *kochi* Melvill and Standen, 1901 : 374.
Cerithium (?*Vertagus*) *kochii* Sturany, 1903 : 261.

MATERIAL. Western Khor, 1 live.

Genus *TRIPHORA* Blainville, 1828

Triphora acuta (Kiener, 1841–42)

Cerithium acutum Kiener, 1841–2 : 79, pl. 32, fig. 2.
Triforis acutus Melvill and Standen, 1901 : 376.
Triphora acuta Melvill, 1928 : 102. Hudson, Eames and Wilkins, 1957 : 397.

MATERIAL. Sta. 12, 1 dead; Western Khor, 1 dead.

Triphora sp.

(Pl. 4, figs 4, 5)

Shell straight sided, whorls 11–12, gradually increasing in size, protoconch erroded, whorls ornamented with latitudinal rows of 16 shinning gemmules, 3 rows on each whorl except the body whorl which has 4 and the gemmules increase to 18; the adapical row is brown in colour, the middle one cream and the abapical one pearly white, on each whorl these are joined latitudinally by relatively high ridges which are nearly straight on the upper whorls but on the body whorl they are at an angle to the columella thus giving the shell a reticulated appearance. The suture is

fairly deep and distinct. Mouth rounded with a sharp lip, embayment at the point of juncture with the body whorl, channel at the base of the columella strongly curved and reflected. Animal unknown.

MATERIAL. Sta. 67a; 4 live.

I am unable to specifically identify the above specimens and two other juveniles collected by Winckworth in the B.M.(N.H.) are left undescribed, as the protoconch is eroded. Barnard (1963) pointed out 'a description of the protoconch is essential' for the acceptance of species in this genus.

The specimens examined closely resemble *Triphora acuta* (Kiener) but differ in the two upper rows of gemmules being more widely spaced than in *acuta* and also having the rows of gemmules of approximately equal size while in *acuta* the middle row is reduced in size.

Superfamily **CALYPTRACEA**

Family **CALYPTRAEIDAE**

Genus ***CALYPTRAEA*** Lamarck, 1799

Calyptrea pellucida (Reeve, 1859)

Trochita pellucida Reeve, 1859 : sp. 2.
C. pellucida Melvill and Standen, 1901 : 362. Thorson, 1940 : 172.

MATERIAL. Eastern Khor, 29 from 17 stations; Western Khor, 56 from 24 stations, dead; unlocated, 1.

I agree with Melvill and Standen (1901) and Thorson (1940) that there is little discernible difference between this species and *Calyptraea sinensis* L. from the Mediterranean. The genus has not been recorded for the Suez Canal or Red Sea.

Superfamily **STROMBACEA**

Family **XENOPHORIDAE**

Genus ***XENOPHORA*** Fischer, 1807

Xenophora caperata Philippi, 1849

X. caperata Philippi, 1849 : 100. Biggs and Grantier, 1960 : 388.

MATERIAL. Sta. 13, 1; Eastern Khor, 2; unlocated 1 juvenile.

The specimen from Sta. 13 was very old and had bivalves (*Mytilacea* and *Arcacea*) attached.

Xenophora corrugata (Reeve, 1843)

Phorus corrugata Reeve, 1843 : 163.
X. corrugata Melvill and Standen, 1901 : 361.

MATERIAL. Khor-al-Bazam, 1 juvenile.

Only small fragments of greyish-black coral debris are attached to the keel of this specimen.

Family **STROMBIDAE**

Genus ***TEREBELLUM*** Röding, 1798

Terebellum terebellum (Linnaeus, 1758)

Conus terebellum Linnaeus, 1758 : 718.

MATERIAL. Sta. 13, 1.

Melvill and Standen (1901) record *Seraphs* (= *Terebellum*) *terebellum* from the Gulf of Oman in 18–40 m. The Trucial Coast specimen was found on a sand and rock bottom in 15–20 m and may be a new record for the Persian Gulf proper.

Strombus decorus Röding, 1798

ssp. ***persicus*** Swainson, 1821

S. persicus Swainson, 1821 : pl. 53.
S. beluchiensis Melvill, 1898 : 37. Melvill, 1901 : 380. Biggs, 1958 : 27.

MATERIAL. Sta. 13, 2; Beach, 50.

Reported by Kinsman (1964b) to be common on the shelf.

Strombus sp.

MATERIAL. Unlocated beach, 5.

These specimens have not yet been determined; they do not appear to agree with any of the species as yet reported from the Persian Gulf.

Superfamily **NATICACEA**

Family **NATICIDAE**

Genus ***NATICA*** Scopoli, 1777

Natica lineata Link, 1807

Natica lineata Link, 1807 : 140.

MATERIAL. Sta. 32, 1; Sta. 33, 1; Western Khor, 1.

This is a new record for the Persian Gulf.

Natica sp.

MATERIAL. Sta. 101, 2 egg masses.

These egg-masses seem to be identical with *Natica* sp.B. referred to by Thorson (1940) but considerably smaller. Thorson's example measured 20–25 mm average depth, these are between 14 and 17 mm in depth. The specimens were found in the intertidal zone.

Genus ***SINUM*** Röding, 1798

Sinum (Eunaticina) papilla (Gmelin, 1791)

Nerita papilla Gmelin, 1791 : 3675.
Sigaretus papilla Issel, 1869 : 188.
Sigaretus (Eunaticina) papilla Melvill and Standen, 1901 : 360.
Eunaticina papilla Biggs and Grantier, 1960 : 388.

MATERIAL. Beach, 1.

Superfamily **CYPRAEACEA**

Family **CYPRAEIDAE**

Genus ***CYPRAEA*** Linnaeus, 1758

Cypraea caurica (Linnaeus, 1758)

C. caurica Linnaeus, 1758 : 723. Melvill and Standen, 1901 : 382.
Erronea (Erronea) caurica caurica Haas, 1954 : 47.

MATERIAL. Eastern Khor, 1.

Cypraea grayana. Schilder, 1930

Mauritia grayana Schilder, 1930b : 75.
C. arabica Biggs, 1958 : 273.

MATERIAL. Beach 1.

Cyraea lentiginosa Gray, 1825

C. lentiginasa Gray, 1825 : 489, pl. 7, pl. 12, fig. 1. Melvill and Standen, 1901 : 383.

MATERIAL. Sta. 10, 1 live.

Cypraea turdus Lamarck, 1810

C. turdus Lamarck, 1810 : 94. Issel, 1869 : 111. Sturany, 1903 : 255. Moazzo, 1939 : 166.
C. ovata Melvill and Standen, 1901 : 384.

MATERIAL. Sta. 15, 2 live; Sta. 54, 1; Sta. 55, 1; Sta. 51, 1 juvenile.

This variable species was reported common on the shelf by Kinsman (1964b).

Superfamily MURICACEA

Family MURICIDAE

Genus *MUREX* Linnaeus, 1758

Murex (Hexaplex) küsterianus Tapparone Canefri, 1875

(Pl. 5, figs 1–5, 8, 9)

M. küsterianus Tapparone Canefri, 1875 : 635, pl. 19, figs 1, 2. Biggs, 1969 : 203.
M. spinosus Tryon, 1880 : 106, pl. 28, fig. 257.
M. (Phyllonotus) turbinatus Melvill and Standen, 1901 : 398. Thorson, 1940 : 197.
M. anguliferus Biggs, 1958 : 273. Biggs and Grantier, 1960 : 388.

MATERIAL. Sta. 6, 1 live; Sta. 8, 1 live; Sta. 9, 1 live juvenile; Sta. 10, 3 live; Sta. 13, 1 live; Sta. 34, 1 live; Sta. 61, 2 live; Sta. 92, 3 live juvenile; beach, many.

In the past there has been considerable confusion as to the correct identification of this species. Tapparone Canefri based the description of *M. küsterianus* on two fossil specimens from a raised beach on the Red Sea coast, but added a further record of a living specimen from West Africa. The locality for the latter is probably an error as all other records are from the Persian Gulf, South Arabian coast and Red Sea. The type specimens have not been located in the museum at either Geneva, Genoa or Turin, therefore for comparison the original figure is reproduced here (Pl. 5, fig. 3), together with photographs of the type of *M. turbinatus* Lamarck (Pl 5, figs 6, 7), and the probable type of *M. spinosus* Adams (Pl. 5 figs 1, 2). The latter is a synonym of *M. küsterianus* although Tryon (1880) incorrectly synonymized it with *M. turbinatus*. Material reported by Thorsen (1940) belongs to *M. küsterianus* and it is presumed that the *M. turbinatus* reported by Melvill and Standen (1901) is also this species.

Further material of *M. küsterianus* has been examined from Muscat; Hormuz I. (Biggs 1958); Ras Tanura; Masirah I; S. Arabian coast (Biggs 1969).

Murex scolopax Dillwyn, 1817

M. scolopax Dillwyn, 1817 : 681. Sturany, 1903 : 238. Melvill, 1928 : 104. Biggs and Grantier, 1960 : 388.

MATERIAL. Sta. 50, 1 juvenile; Sta. 51, 1; Sta. 54, 4 fragments; Beach, 2 fragments.

Genus *THAIS* Röding, 1798

Thais carinifera (Lamarck, 1822)

Purpura carinifera Lamarck, 1822 : 241. Fischer, 1841 : 224.
Cuma carinifera Melvill and Standen, 1901 : 400. Hudson, Eames and Wilkins, 1957 : 396.
T. carinifera Tomlin, 1927 : 294. Melvill, 1928 : 105. Moazzo, 1939 : 163, pl. 13, fig. 1. Biggs, 1958 : 273. Biggs and Grantier, 1960 : 389.
T. (Cuma) carinifera Thorson, 1940 : 202.
T. (Cymia) carinifera Haas, 1952 : 116.

MATERIAL. Sta. 63, 1.

Thais pseudohippocastanum (Dautzenberg, 1929)

Purpura (*Thalassa*) *pseudohippocastanum* Dautzenberg, 1929 : 427.
Thais (*Thalassa*) *hippocastaneum* Melvill and Standen, 1901 : 399.
Thais pseudohippocastanum Biggs, 1958 : 273. Biggs and Grantier, 1960 : 389.

MATERIAL. Sta. 61, 1 live; Sta. 92, 5 live.

Dautzenberg (1929) introduced the name *P. pseudohippocastanum* for *P. hippocastanum* Kiener (non Linnaeus, nec Lamarck).

Thais tissoti (Petit, 1852)

Purpura tissoti Petit, 1852 : 163, pl. 7, fig. 4a, b.
T. tissoti Smith, 1891 : 409. Biggs, 1958 : 273. Biggs and Grantier, 1960 : 389.

MATERIAL. Sta. 63, 1 live; Sta. 80, 4 juvenile; Sta. 92, 1 live juvenile.

Genus *DRUPA* Röding, 1798

Drupa margariticola (Broderip, 1833)

Murex margariticola Broderip, 1833 : 177.
Sistrum margariticola Melvill and Standen, 1901 : 400.
D. margariticola Biggs, 1958 : 273.

MATERIAL. Sta. 37, 2; Sta. 38, 1 live; Sta. 39, 1; Sta. 45, 2 live; Sta. 61, 1; Sta. 63, 6; Sta. 92, 3 live; Western Khor, 5.

Most of the specimens are very corroded possibly due to the high salinity of the intertidal waters it inhabits. The above specimens are larger than those from Hormuz I. (Biggs, 1958).

Superfamily **BUCCINACEA**

Family **COLUMBELLIDAE**

Genus *MITRELLA* Risso, 1826

Mitrella (*Mitrella*) *cartwright* (Melvill, 1897)

(Pl. 4, figs 1–3)

Columbella (*M.*) *cartwrighti* Melvill, 1897 : 8, pl. 6, fig. 14.

MATERIAL. Western Khor, 3, 2 juvenile: Eastern Khor, 3.

Three possible syntypes are in the B.M.(N.H.), Reg. no. 1897.7.30.111–114.

Mitrella (*Mitrella*) *blanda* (Sowerby, 1844)

(Pl. 3, figs 1–4)

Columbella blanda Sowerby, 1844 : 137, pl. 39, fig. 145, 146.
C. doriae Issel, 1865 : 395, pl. 1, fig. 3, 4.
C. (*M.*) *blanda* Melvill and Standen, 1901 : 403. Thorson, 1940 : 204.
M. blanda Hudson, Eames and Wilkins, 1957 : 397.
Pyrene (*M.*) *blanda* Biggs, 1958 : 273.

MATERIAL. Sta. 29, 10 live; Sta. 31, 5 live; Sta. 40, 1; Sta. 57, 1; Sta. 59, 2+2 live Sta. 60, 4; Sta. 62, 1; Sta. 63, 5; Sta. 68, 3; Sta. 70, 45; Sta. 81, 3; Sta. 86, 1 live; Sta. 92, 2 live; Sta. 97, 1; Eastern Khor, 17; Western Khor 22; unlocated 10.

There is confusion as to the type locality of this species, on the label with the type is written 'Loanda Africa under stones low water' but the type locality was published as 'Africa on the shore'. The species has otherwise only been recorded from the Persian Gulf and Karachi. From the three specimens in the type series I wish to select a lectotype, reg. no. 1968764.

This species shows a large degree of variation in shell form and colour patterns, which may be regionally distributed.

Mitrella (*Mitrella*) *misera* (Sowerby, 1844)

Columbella miser Sowerby, 1844 : 50. Shopland, 1902 : 173.

MATERIAL. Sta. 79, 2 live.

This is a new record for the Persian Gulf, Melvill & Standen (1901) include *misera* Sowerby in the synonymy of *Columbella* (*Mitrella*) *zebra* Gray from the Makran coast. These shells have lighter markings when compared with Aden specimens.

Genus *PYRENE* Röding, 1798

Pyrene atrata (Gould, 1860)

Columbella (*Anachis*) *atrata* Gould, 1860 : 334.
P. atrata Barnard, 1959 : 180.

MATERIAL. Eastern Khor, 3; Western Khor, 8.

Pyrene (*Seminella*) *phaula* (Melvill & Standen, 1901)

Columbella (*S.*) *phaula* Melvill and Standen, 1901 : 405.
C. (*S.*) *selasphora* Melvill and Standen, 1901 : 406, pl. 33, fig. 7. Melvill, 1903 : 30.

MATERIAL. Western Khor, 6; Eastern Khor, 2.

After examination of the above specimens and a sample from Kuwait it is obvious that *P. phaula* and *P. selasphora* are conspecific. The colour and patterns and shape show continuous variation. The type locality for *selasphora* is Karachi.

Family NASSARIIDAE

Genus *NASSARIUS* Froriep, 1806

Nassarius pullus (Linnaeus, 1758)

Buccinum pullus Linnaeus, 1758 : 737.
Nassa pulla Issel, 1896 : 125. Melvill and Standen, 1901 : 409.
Nassa pullus Sturany, 1903 : 243.
Nassarius pullus Melvill, 1928 : 106. Biggs, 1958 : 274. Biggs and Grantier, 1960 : 389.
Nassa (Nassa) pulla Haas, 1952 : 116.

MATERIAL. Sta. 29, 8 live; Sta. 31, 1 live; Sta. 32, 1 live; Sta. 40, 1 live; Sta. 48, 12 live; Sta. 86, 1 live.

Nassarius stigmarius (A. Adams, 1852)

Nassa stigmaria A. Adams, 1852 : 96.
Nassa (Niotha) stigmaria Melvill and Standen, 1901 : 412. Melvill, 1928 : 106.
Nassarius stigmarius Biggs and Grantier, 1960 : 389.

MATERIAL. Sta. 43, 1 live; Sta. 77, 1 live; Sta. 100, 1 live.

Family FASCIOLARIIDAE

Genus *FUSINUS* Rafinesque, 1815

Fusinus townsendi (Melvill, 1899)

Fusus townsendi Melvill, 1899 : pl. 2, fig. 1. Melvill, 1901 : 418.
Fusinus townsendi Melvill, 1928 : 107.

MATERIAL. Sta. 15, 1; Sta. 10, 1; beach, 2.

Melvill (1901) records the species from 7–50 fms., and the above specimens were from fairly deep water. The species has only been recorded from the Persian Gulf and Karachi.

Superfamily VOLUTACEA

Family OLIVIDAE

Genus *ANCILLA* Lamarck, 1799

Ancilla cinnamomea Lamarck, 1801

Ancilla cinnamomea Lamarck, 1801 : 73. Melvill and Standen, 1901 : 427. Melvill, 1928 : 110. Biggs and Grantier, 1960 : 389.
Ancillaria castanea Sowerby, 1830 : 5.
Ancillaria cinnamomea Tryon, 1853, 5 : 93.

MATERIAL. Sta. 14, 1 live; Sta. 63, 1 live; Sta. 70, 1; Sta. 90, 1 live; Sta. 100, 1 live; Eastern Khor, 2; unlocalised, 6.

I have followed Tryon (1883) who placed *castanea* in the synonymy of *cinnamomea*. Melvill and Standen (1901) and Melvill (1928) regard the two as distinct species.

Ancilla eburnea (Deshayes, 1830)

Ancillaria eburnea Deshayes, 1830 : 42.
Ancilla eburnea Melvill and Standen, 1901 : 427.

MATERIAL. Sta. 58, 2; Sta. 70, 1; Sta. 76, 1 live; Sta. 82, 4 live.

This is a new record for the Persian Gulf as Melvill and Standen record the species for Jask eastwards along the Makran Coast.

Genus *OLIVA* Bruguière, 1789

Oliva bulbosa (Röding, 1798)

Porphyria bulbosa Röding, 1798 : 37.
O. bulbosa Melvill and Standen, 1901 : 426. Biggs, 1958 : 274.

MATERIAL. Beach, 46.

Oliva caerulea (Röding, 1798)

Porphyria caerulea Röding, 1798 : 33.

MATERIAL. Beach, 7.

Family MARGINELLIDAE

Genus *PERSICULA* Schumacher, 1817

Persicula cf. *asellina* (Jousseaume, 1875)

Gibberula asellina Jousseaume, 1875 : 243, pl. 7, fig. 6.

MATERIAL. Eastern Khor, 1.

This shell was damaged hence the tentative identification. The type locality is Mauritius.

Persicula isseli (Nevill, 1875)

Marginella isseli Nevill, 1875 : 95.
M. (*P.*) *oodes* Melvill, 1898 : 16, pl. 1, fig. 16.
M. oodes Melvill, 1928 : 109.

MATERIAL. Western Khor, 3.

Specimens were also examined from 40 km E. of Ras Mussandam and 40 km N.–N.E. of Ras Mussandam.

Persicula mazagonica (Melvill, 1893)

Marginella (*Gibberula*) *mazagonica* Melvill, 1893 : 57, pl. 1, fig. 10. Melvill and Standen, 1901 : 425. Melvill, 1928 : 109.
M. mazagonica Shopland, 1902 : 173.
G. (*Cysticus*) *mazagonica* Hudson, Eames and Wilkins, 1957 : 396.

MATERIAL. Western Khor, 4.

Persicula shoplandi (Melvill, 1897)

Marginella (*Cryptospira*) *Shoplandi* Melvill, 1897 : 8.
M. (*Gibberula*) *shoplandi* Melvill and Standen, 1901 : 425.

MATERIAL. Eastern Khor, 1.

Persicula subflava (Preston, 1906)

Marginella subflava Preston, 1906 : 35.

MATERIAL. Sta. 81, 2.

This is a new record for the Persian Gulf.

Family **MITRIDAE**

Genus ***MITRA*** Röding, 1798

Subgenus ***SCABRICOLA*** Swainson, 1840

Mitra (Scabricola) bovei. Kiener, 1839

Mitra bovei Kiener, 1939 : 9, pl. 2, fig. 5. Issel, 1869 : 117, 352. Cooke, 1885a, 334. Melvill and Standen, 1901 : 418. Shopland, 1902, 173. Moazzo, 1939 : 146.

MATERIAL. Sta. 9, 1.

Sub-class *OPISTHOBRANCHIA*

Superfamily **PTENOGLOSSA**

Family **PYRAMIDELLIDAE**

Genus ***EULIMELLA*** (Forbes) Gray, 1847

Eulimella kaisensis Melvill, 1898

Eulimella kaisensis Melvill, 1898 : 21, pl. 2, fig. 5. Melvill, 1911 : 181, pl. 4, fig. 9.

MATERIAL. Western Khor, 3.

Although only recorded for the Persian Gulf and Gulf of Oman, I have examined specimens from the Biggs collection from Dongonab Bay, Red Sea.

Genus ***TURBONILLA*** (Leach) Risso, 1826

Turbonilla icela Melvill, 1911

Turbonilla icela Melvill, 1911 : 185, pl. 4, fig. 15.

MATERIAL. Eastern Khor, 1; Western Khor, 5.

Melvill (1911) records this species from less saline waters than those now reported on.

Family **STILIFERIDAE**

Genus ***MUCRONALIA*** A. Adams, 1860

Mucronalia lepida Melvill, 1906

Mucronalia lepida Melvill, 1906 : 73, pl. 7, fig. 8.

MATERIAL. Sta. 30, 1.

This is a new record for the Persian Gulf. The type locality is Gulf of Oman, 156 fms.

Superfamily **CEPHALASPIDEA**

Family **ACTAEONIDAE**

Genus ***SOLIDULA*** Fischer von Waldheim, 1807

Solidula sp.

MATERIAL. Sta. 70, 1.

This specimen is possibly the worn shell of *Solidula solidula* Linnaeus.

Family **RINGICULIDAE**

Genus ***RINGICULA*** Deshayes, 1838

Ringicula propinquans Hinds, 1844

Ringicula propinquans Hinds, 1844 : 96. Melvill and Standen 1901 : 457.

MATERIAL. Western Khor, 6.

Family **BULLARIIDAE**

Genus ***BULLARIA***

Bullaria ampulla (Linnaeus, 1758)

Bulla ampulla Linnaeus, 1758 : 727. Issel, 1869 : 167. Melvill and Standen, 1901 : 456. Sturany, 1903 : 268. Moazzo, 1939 : 136.
Bulla (Bulla) ampulla Haas, 1952 : 116.
Bullaria ampulla Biggs, 1958 : 274. Biggs and Grantier, 1960 : 389.

MATERIAL. Sta. 9, 1 specimen juvenile; Sta. 12, 1; Sta. 52, 1; Sta. 66, 1; Eastern Khor, 9; Western Khor, 19; beach, 30.

Family **ATYIDAE**

Genus ***ATYS***

Atys cylindricus (Helbling, 1779)

Bulla cylindrica Helbling, 1779 : 122.
Alicula cylindrica Issel, 1869 : 168.
Atys (*Alicula*) *cylindrica* Melvill and Standen, 1901 : 454.
Atys cylindricus Sturany, 1903 : 268. Melvill, 1928 : 112.

MATERIAL. Sta. 70, 1; Western Khor, 5.

Family **RETUSIDAE**

Genus ***RETUSA*** Brown, 1827

Retusa omanensis Melvill, 1903

R. omanensis Melvill, 1903 : 321, pl. 23, fig. 19. Melvill, 1928 : 112.

MATERIAL. Western Khor, 7.

This is a new record for the Persian Gulf. The type localities are the Gulf of Oman in 314 m and 80 m in Charbar Bay, Makran Coast, so these dead specimens may have been washed in from deeper water.

Family **AGLAJIDAE**

Genus ***AGLAJA***

Aglaja sp. c.f. ***nigra*** von Martens, 1879

Doridium nigrum von Martens, 1879 : 738.

MATERIAL. Sta. 82A, 1 live.

This is the first record of the genus in the Persian Gulf. The locality is in the low intertidal zone, outer lagoon, 1 mile N.E. of Halat al Bahraini.

Order ACOELA

Superfamily **DORIDACEA**

Family **DORIDIDAE**

Genus ***CASELLA*** H. & A. Adams, 1854

Casella atromarginata (Cuvier, 1804)

Doris atromarginata Cuvier, 1804 : 452, 473.
C. atromarginata Vayssière, 1912, 55. Haas, 1920 : 139. O'Donoghue, 1929 : 726. White, 1951 : 248. Marcus and Marcus, 1960 : 902.

MATERIAL. Eastern Khor, 2 live.

Little seems to have been written on the Nudibranch fauna of the Persian Gulf. Melvill and Standen do not mention any and Thorson (1940) only mentions four

species. The first record of this species is in Marcus and Marcus (1960) who mention neither the exact locality nor the number of specimens found, only stating that it occurs at 18 m depth in the Gulf. White (1951) records the species for Suez Bay.

Superfamily **ONCHIDIACEA**

Family **ONCHIDIIDAE**

Genus ***ONCHIDIUM*** Buchanan, 1800

Onchidium peronii Cuvier, 1805

P. peronii Cuvier, 1805 : 37, White, 1951 : 241.
O. (*Peronia*) *peronii* Issel, 1869 : 153. Sturany, 1903 : 269.
P. peronii O'Donoghue, 1929 : 833.

MATERIAL. Sta. 96, 2 live; unlocated 1 live juvenile.

In the adult specimens the foot is lighter than the dorsum whilst in the juvenile it is the same colour.

Sub-Class *PULMONATA*

Order BASOMMATOPHORA

Superfamily **ELLOBIACEA**

Family **ELLOBIIDAE**

Genus ***MELAMPUS*** Montford, 1810

Melampus lividus (Deshayes, 1830)

Auricula livida Deshayes, 1830 : 91.
M. lividus Fischer, 1901 : 96. Moazzo, 1939 : 130. Biggs, 1958 : 274.

MATERIAL. Sta. 92, 1.

The only previous record for the Persian Gulf for this species is from Bundar Abbas (Biggs, 1958), but there are several unrecorded specimens from Bushire in the Liverpool Museum collected by Dr Blair in 1915–1916.

Melampus sp.

MATERIAL. Sta. 72, 1.

Genus ***LAEMODONTA*** Philippi, 1846

Laemodonta (Laemodonta) rapax (Dhorn, 1859)

Plecotrema rapax Dhorn, 1859 : 204.
Laemodonta bicolor Biggs, 1965 : 339.

MATERIAL. Sta. 72, 1; Sta. 70, 1; Eastern Khor, 1.

Not previously reported from the Persian Gulf.

Superfamily **SIPHONARIACEA**

Family **SIPHONARIIDAE**

Genus ***SIPHONARIA*** Sowerby, 1824

Siphonaria asghar Biggs, 1958

S. asghar Biggs, 1958 : 249.

MATERIAL. Sta. 75, 4 live.

This record extends the known distribution of the species into the Persian Gulf as the original locality was Hormuz Island. Other records of this species of *Siphonaria* in the British Museum (Natural History) consist of a long series of this species from East Pier, Karachi (Winckworth) and two specimens from Muscat (Townshend) and some from Bombay (Blanford and Peile).

Siphonaria rosea Hubendick, 1943

S. rosea Hubendick, 1943 : 1, pl. 1, fig. 1a, b. Hubendick, 1946 : 53, pl. 4, figs 12–15. Biggs and Grantier, 1960 : 389.

MATERIAL. Sta. 61, 1 live; Sta. 63, 4 live; Sta. 92, 1 live.

The type locality is N.W. of Bushire, northern end of the Persian Gulf; it is possibly distributed throughout the Gulf but not yet recorded outside this area.

Class *BIVALVIA*

Superfamily **NUCULACEA**

Family **NUCULANIDAE**

Genus ***NUCULANA*** Link, 1807

Nuculana confusa (Hanley, 1860)

Leda confusa Hanley, 1860 : 119, pl. 228, fig. 85.
N. (*N.*) *confusa* Prashad, 1932 : 19.

MATERIAL. Western Khor, 16 valves.

This is a new record for the genus and species for the Persian Gulf.

Superfamily **ARCACEA**

Family **ARCIDAE**

Genus ***ACAR*** H. & A. Adams, 1857

Acar plicata Dillwyn, 1817

Arca plicata Dillwyn, 1817 : 228.
Arca divaricata Fischer, 1891 : 228. Tomlin, 1927 : 301.
Barbatia divaricata Sturany, 1901 : 289.
Arca (*Acar*) *plicata* Moazzo, 1939 : 55. Haas, 1952 : 116. Haas, 1954 : 47.
Arca (*Acar*) *divaricata* Biggs, 1958 : 274. Biggs and Grantier, 1960 : 389.

MATERIAL. Sta. 31, 1 live; Sta. 63, 3 live; Sta. 67a, 1 live; Sta. 97, 2 live; Eastern Khor, 2 live; Western Khor, 2 live.

It is interesting to note the variety of habitats from which this species was collected. Those from the Khor-al-Bazm were generally from a sandy bottom but one live specimen from the eastern end was collected from 4 ft of water at a temperature of 69·5°F, pH 7·8. Two specimens from the western end (nearer the open sea) were collected in the middle of a coral bank. Station 97 was in the intertidal zone; Kinsman (1964b) records the species as common in the Mid-Lagoon.

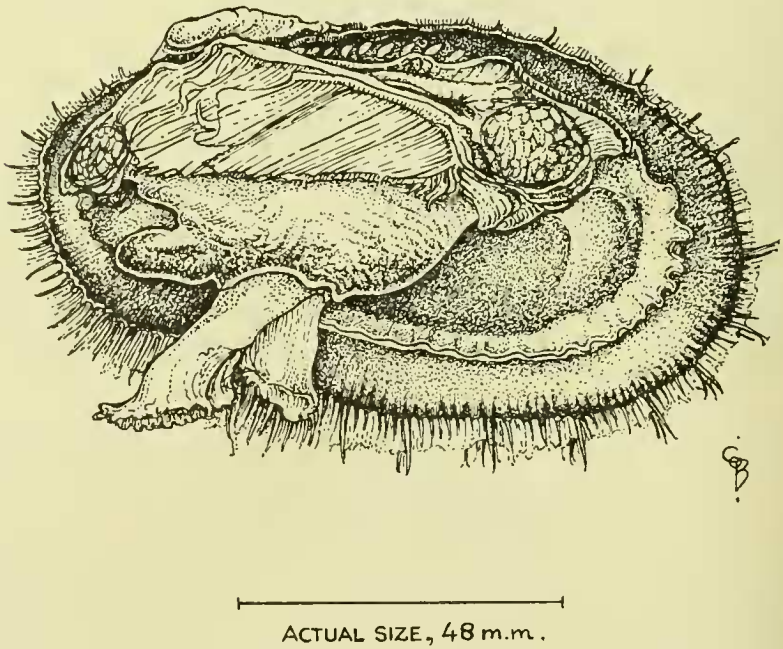


FIG. 3. *Barbatia lacerata* (Bruguière) lateral view with left valve and mantle removed to show general anatomical characters.

Genus *BARBATIA* Gray, 1842

Barbatia lacerata (Bruguière, 1789)

(Text-fig. 3)

Arca lacerata Bruguière, 1789 : 101. Tomlin, 1927 : 319.
Arca (*Barbatia*) *lacerata* Moazzo, 1939 : 53.

Material. Sta. 10, 1 live; Sta. 90, 1 live; Sta. 94, 3 live; Western Khor, 1 live; unlocated, 2 live; Eastern Khor, 1 valve; beach 21.

This is a new record for the Persian Gulf, which seems surprising in view of the variety of habitats. Kinsman (1964b) notes that it is common on the shelf, on the reef and the oolite delta (intertidal zone); Evans collected it on the reef and the intertidal zone whilst Kendall (1966) records it from the Khor-al-Bazm in the intertidal. The species also occurs at Ras Tanura at the northern end of the Persian Gulf and was collected by Grantier (personal communication).

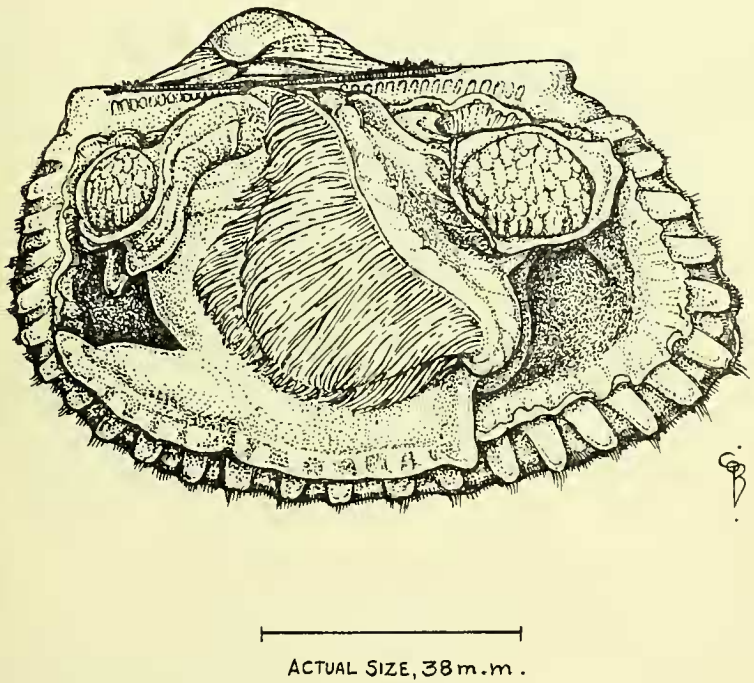


Fig. 4. *Anadara antiquata* (Linnaeus) lateral view with left valve and mantle removed to show general anatomical characters.

Genus *ANADARA* Gray, 1847

Anadara antiquata (Linnaeus, 1758)

(Text-fig. 4)

Arca antiquata Linnaeus, 1758 : 694. Jeffreys, 1879 : 571.

MATERIAL. Sta. 10, 1 live; Sta. 13, 5 live; Sta. 3, 1 valve.

This is a new record for the Persian Gulf. It is remarkable that this species was not recorded by Melvill and Standen (1907) who were reporting on dredged material rather than littoral collections in view of the fact that the above 6 live specimens were all taken at a depth of over 50 feet.

Anadara ehrenbergi (Dunker, 1868)

Arca ehrenbergi Dunker, 1868 : pl. 38, figs. 17, 18.
Arca (*Anomalocardia*) *ehrenbergi* Issel, 1869 : 91, 258.
Arca (*Anadara*) *ehrenbergi* Moazzo, 1939 : 52, pl. 5, fig. 1.

MATERIAL. Sta. 7, 1; unlocated, 9.

This is a new record for the Persian Gulf.

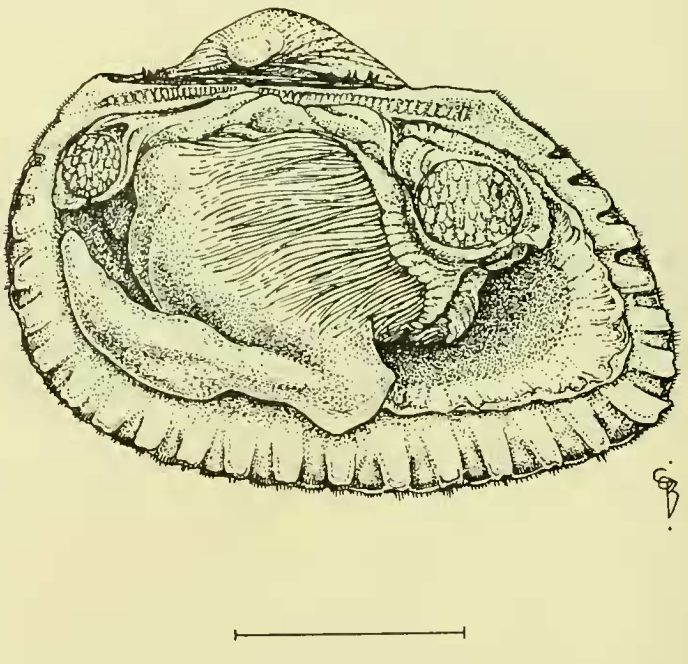


FIG. 5. *Anadara uropigmelana* (Bory St. Vincent) lateral view with left valve and mantle removed to show general anatomical characters.

Anadara uropigmelana (Bory de St. Vincent, 1824)

(Text-fig. 5)

Arca uropigmelana Bory de St. Vincent, 1824 : 156, pl. 307, fig. 2. Biggs and Grantier, 1960 : 389.
Arca (*Anadara*) *uropigmelana* Moazzo, 1939 : 52.
Arca (*Arca*) *uropigmelana* Haas, 1952 : 116, Haas, 1954 : 47.

MATERIAL. Sta. 14, 1 live; Sta. 3, 1 valve; Sta. 54, 3 valves; Sta. 58, 3 valves; Sta. 70A, 1 valve; unlocated, 12 valves.

Reported by Kinsman (1964b) as an uncommon species on the shelf.

Genus *SCAPHARCA* Gray, 1847

Scapharca tricenicosta Nyst, 1848

Arca tricenicosta Nyst, 1848 : 74.
Arca (*Anadara*) *tricenticosta* Prashad, 1932 : 39.

MATERIAL. Sta. 14, 1 live.

This is a new record for the Persian Gulf, it appears to be a rare shell. The example collected was dredged in 50–60 feet of water and on a sandy bottom with small amounts of rock. Two specimens in the B.M.(N.H.) collection (Winckworth collection) were dredged off Muscat in 1932.

Scapharca vellicata (Reeve, 1844)

(Text-fig. 6)

Arca vellicata Reeve, 1844, 2 : Sp. 33. Issel, 1869 : 257.
Arca (*Scapharca*) *birleyana* Melvill and Standen, 1907 : 794. Melvill, 1928 : 113.
Arca (*Anadara*) *vellicata* Lamy, 1907 : 251.
Arca (*Anadara*) *birleyana* Prashad, 1932 : 41.

MATERIAL. Sta. 3, 1; Sta. 8, 1 live; Sta. 13, 1 live; Sta. 14, 4 live.

Genus *TRISIDOS* Röding, 1798

Trisidos tortuosa (Linnaeus, 1758)

Arca tortuosa Linnaeus 1758 : 693. Fischer, 1891 : 228.
Parallelipipedum tortuosum Melvill and Standen, 1907 : 796.
Arca (*Trisidos*) *Tortuosa* Barnard, 1964 : 369.

MATERIAL. Western Khor, 2 fragments.

Superfamily **LIMOPSACEA**

Family **GLYCYMERIDAE**

Genus ***GLYCYMERIS*** da Costa, 1778

Glycymeris hoylei Melvill and Standen, 1899

G. hoylei Melvill and Standen, 1899 : 187, pl. 11, fig. 24.

MATERIAL. Western Khor, 9 valves, juvenile.

Material from Tuticorin (Winckworth) and Providence I, north of Madagascar (Gardiner) in the B.M.(N.H.) were also examined. A specimen from the latter locality had a breadth of 35 mm while the maximum measurement for those from the Western Khor is 11·5 mm.

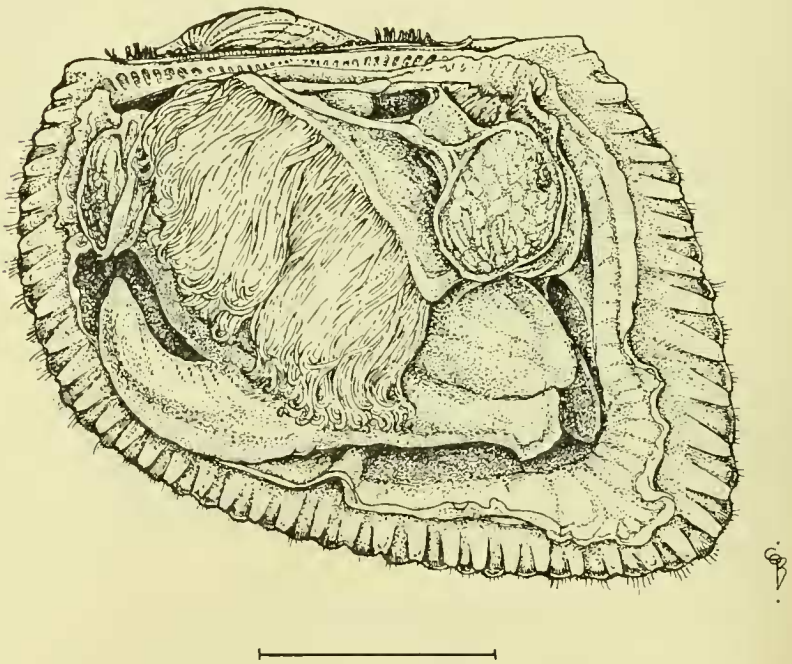


FIG. 6. *Scapharca vellicata* (Reeve) lateral view with left valve and mantle removed to show general anatomical characters.

Glycymeris lividus (Reeve, 1843)

Pectunculus lividus Reeve, 1843 : sp. 51, Moazzo, 1939 : 58, pl. 5, fig. 3.
Pectunculus heroicus Melvill and Standen, 1907 : 798 : pl. 55, fig. 1.

MATERIAL. Sta. 51, 1 valve; Sta. 70A, 1 valve.

After comparing the types of *P. lividus* Reeve and *P. heroicus* Melvill and Standen I consider them conspecific.

Glycymeris pectunculus (Linnaeus, 1758)

Arca pectunculus Linnaeus, 1758 : 695.

MATERIAL. Sta. 1, 2 live; Sta. 9, 1 live juvenile; Sta. 10, 1 live, 1 dead; Sta. 13, 2 live; Sta. 70A, 1; Sta. 11, 1 valve; Sta. 12, 1 valve; Western Khor, 2 valves.

All these stations are on the off-shore shelf, one being about 7 miles N.E. of Jeziret Dalma.

Glycymeris striatularis (Lamarck, 1819)

Pectunculus striatularis Lamarck, 1819 : 52. Melvill and Standen, 1907 : 789.

MATERIAL. Sta. 42, 1 live; Sta. 85, 1 live; Sta. 50, 4 valves; Sta. 54, 19 valves; Sta. 55, 3 valves; Sta. 56, 200 valves; Sta. 57, 40 valves; Sta. 70A, 7 valves; Western Khor, 1 valve; Es-Saddiyat I., 32 valves; beach, 57 valves.

A common intertidal species.

Superfamily **MYTILACEA**

Family **MYTILIDAE**

Genus ***CRENELLA*** Brown, 1827

Crenella adamsiana Melvill and Standen, 1907

C. adamsiana Melvill and Standen, 1907 : 801, pl. 55, fig. 2. Melvill, 1928 : 113.

MATERIAL. Eastern Khor, 6 valves; Western Khor, 19 valves; unlocated, 4 valves.

Melvill (1928) reports that a rounded form of this species is found in 40 fms, Charbar Bay (Makran Coast). The above specimens are also of this form.

Genus ***MODIOLUS*** Lamarck, 1799

Modiolus rhomboideus Reeve, 1857

Modiola rhomboidea Reeve, 1857, *10* : sp. 28. Melvill and Standen, 1907 : 800.

MATERIAL. Western Khor, 2 juveniles.

This is a new record for the Persian Gulf. The specimens from the Khor were in a sponge when received, and those mentioned by Melvill and Standen (1907) were also in sponges, at 10 fms.

Genus ***BRACHIDONTES*** Swainson, 1840

Brachidontes variabilis (Krauss, 1848)

Mytilus variabilis Krauss, 1848 : 25, pl. 2, fig. 5. Issel, 1869 : 94. Sturany, 1901 : 288. Melvill and Standen, 1907 : 799.
Brachydontes variabilis Fischer, 1870 : 178. Tomlin, 1927 : 302.
M. (Hormomya) variabilis Moazzo, 1939 : 43.
Brachidontes variabilis Rees and Stuckey, 1952 : 197. Hudson, Eames and Wilkins, 1957 : 397. Barnard, 1964 : 395.
Brachidontes (H.) variabilis Haas, 1952 : 116.

MATERIAL. Sta. 10, 1 live; Sta. 28, many live; Sta. 36, 2 live; Sta. 44, 1 live juvenile; Sta. 59, 1 live; Sta. 62, 17 live; Sta. 63, 2 live; Sta. 68, many; Sta. 86, 5+2 valves; Eastern Khor, 22 live, 30 valves; Western Khor, 117 valves.

This is the third most common bivalve on the Trucial Coast. Specimens were found in a wide variety of habitats including rock, coral, sand and on Mangrove rhizophores. The depth ranged from the littoral to 150 m.

Genus ***SEPTIFER*** Recluz, 1848

Septifer bilocularis (Linnaeus, 1758)

Mytilus bilocularis Linnaeus, 1758 : 705.
S. bilocularis Melvill and Standen, 1907 : 799. Moazzo, 1939 : 48. Barnard 1964 : 395. Taylor, 1968 : 203.

MATERIAL. Sta. 10, 8 live; Sta. 11, 1.

Melvill and Standen (1907) record this species from Kuwait and further south (27°N, 52°E) at 10 fms and 40 fms respectively. Barnard (1964) records dead shells at 55 fms from South Africa. The above specimens were collected at 8–14½ fms, some attached to *Pinctacta radiata* Leach and some to a sponge.

Genus ***MUSCULUS*** Röding, 1798

Musculus spp.

MATERIAL. Sta. 78, 1 live; Western Khor, 1 valve.

The above specimens are the only ones which can be referred to this genus with any certainty, the remainder of the material being too worn.

Genus ***LITHOPHAGA*** Röding, 1798

Lithophaga lithophaga (Linnaeus, 1758)

Mytilus lithophagus Linnaeus, 1758 : 705.

MATERIAL. Sta. 94, 4 live; Eastern Khor, 1 juvenile, live.

From a study of the shell it appears that this name should be applied to these specimens in spite of the fact that it is usually considered a Mediterranean one. In the collection of the B.M.(N.H.) are specimens from Aden (Dinshau Collection)

which have been referred to this species by Dr R. Turner and Dr K. Boss who studied the genus some years ago. This supports the view that *Lithophaga lithophaga* (Linnaeus) should be accepted as a species common to both seas.

This is a new record for the Persian Gulf. Melvill and Standen (1907) record *Lithodomus attenuatus* Deshayes for the area and comment 'Locality not precisely specified'. The few specimens collected were found boring in corals $\frac{1}{2}$ m north of the north coast of Jeziret el Ftaisi by Kinsman (1964b) who records the species as common on the reef.

Superfamily **PTERIACEA**

Family **ISOGNOMONIDAE**

Genus ***ISOGNOMON*** Lightfoot, 1786

Isognomon ephippium (Linnaeus, 1758)

Ostrea ephippium Linnaeus, 1758 : 700.
I. ephippium Biggs and Grantier, 1960 : 390.
Melina ephippium Spry, 1964 : 10, pl. 1, fig. 20.

MATERIAL. Sta. 9, 1; Eastern Khor, 1; juvenile, live.

Isognomon legumen (Gmelin, 1791)

Ostrea legumen Gmelin, 1791 : 3399.
I. legumen Dautzenberg, 1929 : 566.

MATERIAL. Sta. 31, 1 live; Sta. 91, 1 live; Sta. 94, 3 live.

This is a new record for the Persian Gulf. The above specimens were found on hard substrate. The specimen from Sta. 91 where the salinity was 42‰ is distorted and curled into a semi-lunar shape.

Isognomon dentifer (Krauss, 1848)

Perna dentifera Krauss, 1848 : 28.
Parviperna dentifera Barnard, 1964 : 410.
Melina dentifera Spry, 1964 : 10.
Isognomon dentifer Taylor, 1968 : 203.

MATERIAL. Sta. 61, 1 live; Sta. 68, 19 live; Sta. 93, 2 live; Western Khor, 26, 23 live.

This is the first record of the species in the Persian Gulf, it appears to be very common occuring in colonies attached to rock and coral. Specimens from the Persian Gulf and Gulf of Aqaba seem to be smaller than those from other localities.

Genus ***MALLEUS*** Lamarck, 1799

Malleus regula (Førsskål, 1775)

Ostrea regula Forsskål, 1775 : 124.
M. regula Issel, 1869 : 97. Smith, 1891 : 434. Tomlin, 1927 : 301. Moazzo, 1939 : 41. Barnard, 1964 : 406.
M. cf. regula Biggs and Grantier, 1960 : 390.

MATERIAL. Sta. 93, 1 live; Western Khor, 5 live, 1 juvenile.

This is a new record for the Persian Gulf, confirming Biggs and Grantier (1960). It is a common species on the reef Kinsman (1964b) and also on a different substrate in the Khor.

Superfamily **PTERIACEA**

Family **PTERIIDAE**

Genus ***PINCTADA*** Röding, 1798

Pinctada margaritifera (Linnaeus, 1758)

Mytilus margaritifera Linnaeus, 1758 : 704.
Meleagrina margaritifera Issel, 1869 : 95. Sturany, 1901 : 289.
Margaritifera margaritifera Melvill and Standen, 1907 : 803.
P. margaritifera Biggs, 1958 : 275. Biggs and Grantier, 1960 : 390. Reed, 1966 : 26.

MATERIAL. Western Khor, 2 juveniles; unlocated, 2 juveniles.

The ecology of this species in the Red Sea was reported on by Reed (1966).

Pinctada radiata (Leach, 1814)

Avicula radiata Leach, 1814 : 98, pl. 43.
Perlamater vulgaris Schumacher, 1817 : 108.
Perlamater inflata Schumacher, 1817, 108.
Pteria (*Pinctada*) *vulgaris* Moazzo, 1939 : 42, pl. 4, fig. 1.
Pinctada vulgaris Biggs, 1958 : 275.
Pinctada radiata Ranson, 1961 : 7.

MATERIAL. Sta. 10, 3 live juveniles; Sta. 12, 3 live; Sta. 38, 2 juveniles; Eastern Khor 1 live, 3 valves; Western Khor, 1+1 valve; beach, 174 valves.

As reported by Ranson (1961) this species has been erroneously recorded as *vulgaris* Shumacher and *inflata* Schumacher.

Pinctada spp.

I am unable to specifically identify a large number of very young specimens found in the samples of the deposits from the Khor-al-Bazm.

Family **PINNIDAE**

Genus ***PINNA*** Linnaeus, 1758

Pinna atropurpurea Sowerby ssp. ***mutica*** Reeve, 1858

P. atropurpurea mutica Reeve, 1858, *11* : sp. 33.

MATERIAL. Sta. 102, 1.

This is a new record for the Persian Gulf. J. Murray (personal communication) reports this species in Sea Grass in 9 ft of water off Abu Dhabi in the central part of the lagoon between that island and Es Sadiyat I.

Pinna bicolor Gmelin, 1791

P. bicolor Gmelin, 1791 : 3366. Melvill and Standen, 1907 : 806. Moazzo, 1939 : 40. Barnard, 1964 : 417.

MATERIAL. Sta. 87, 1 valve, damaged.

Superfamily **PECTINACEA**

Family **PECTINIDAE**

Genus ***PLICATULA*** Lamarck, 1801

Plicatula plicata (Linnaeus, 1767)

Spondylus plicata Linnaeus, 1767 : 1136.
P. plicata Moazzo, 1939 : 27. Barnard, 1964 : 433.

MATERIAL. Sta. 66, 1.

This is a new record for the Persian Gulf.

Genus ***CHLAMYS*** Röding, 1798

Chlamys ruschenbergerii (Tryon, 1870)

Pecten ruschenbergerii Tryon, 1870 : 171, pl. 14, fig. 1.
C. ruschenbergerii Eames and Cox, 1956 : 13, pl. 3, figs 2, 3. Biggs and Grantier, 1960 : 390.

MATERIAL. Sta. 9, 1 live, juvenile; Sta. 12, 3 live; Sta. 54, 1 valve juvenile; Sta. 58, 1 juvenile; Eastern Khor, 1 juvenile; Western Khor, 2 fragments; unlocated, 3 valves.

Kinsman (1964b) records the species as common on the off-shore shelf and the live specimens collected by Evans stations 9 and 12 were from a coral zone well off shore.

One of the examples from Sta. 12 contained a small starfish which Miss Ailsa M. Clark of the B.M.(N.H.) has determined as a juvenile *Amphioplus* sp.; this lay in the curve of the gills and immediately behind the adductor muscle. As there were a number of calcareous pellets in the lobes of the mantle on either side of the ligament it is difficult to say whether or not the starfish had been washed in by chance, as

had the pellets, or whether it was there by its own action, it was near the centre of the viceral cavity. Thomson (1934, p. 171) states that ' . . . the little pea-crab (*Pinnotheres pisum*) that is often found inside the Norway cockle (*Cardium norvegicum*), gets food as well as shelter there.'

Eames and Cox (1956) record this species from the Miocene and Pliocene of Persia.

Genus ***SPONDYLUS*** Linnaeus, 1758

Spondylus exilis Sowerby, 1895

S. exilis Sowerby, 1895 : 280, pl. 18, fig. 14. Melvill and Standen, 1907 : 811.

Material. Sta. 10, 1 juvenile live; Sta. 50, 1 valve; Sta. 51, 6 valves; Sta. 54, 2 valves; Sta. 56, 2 valves; Sta. 58, 5 valves; Sta. 69, 1 valve; Sta. 70a, 2 valves; Sta. 93, 1 live; Western Khor, 3 valves; Eastern Khor, 3 valves; unlocated 21 valves.

Kinsman (1964b) records this species as common on the coastal shelf. The only live shell collected was from intertidal waters, on a rocky shore with limestone boulders. The specimen from Station 10 was from a depth of 50–88 ft., attached to *Pinctada radiata*.

Family **LIMIDAE**

Genus ***LIMA*** Bruguière, 1797

Lima (Lima) tenuis (H. Adams, 1870)

Radula tenuis H. Adams, 1870 : 793.
L. tenuis Shopland, 1902 : 179.

Material. Sta. 11, 1 live; Eastern Khor, 1+4 valves; Western Khor, 1+5 valves; Sta. 46, 1 valve.

The above specimens are conspecific with one from Aden in the B.M.(N.H.) (Dinshau ex Shopland) determined by Jousseaume. Moazzo (1939) includes *tenuis* in the synonymy of *Lima (Mantellum) fragilis* Lamarck ex Chemnitz which is found in the Suez Canal to Lake Timsah and Suez Bay.

Subgenus ***LIMATULA*** S. Wood, 1839

Lima (Limatula) leptocarya Melvill, 1898

L. (L.) letocarya Melvill, 1898 : 28, pl. 2, fig. 2. Melvill, 1907 : 812.

Material. Western Khor, 1 valve.

A new record for the Persian Gulf as both Melvill's records are for the Gulf of Oman.

Superfamily **OSTRACEA**

Family **OSTREIDAE**

Genus ***CRASSOSTREA***

Crassostrea cucullata (Born, 1778)

Ostrea cucllata Born, 1778 : 100. Sturany, 1901 : 291. Melvill and Standen, 1907 : 806. Rees and Stuckey, 1952 : 198.
O. (*Alectryonia*) *cucllata* Biggs, 1958 : 275.
C. cucullata Barnard, 1964 : 446.

MATERIAL. Sta. 93, 2 live.

Kinsman (1964b) reports the species as common on the reef and shelf divisions of the coastline; the above specimens are a flat form of this extremely variable species.

Superfamily **ASTARTACES**

Family **CRASSATELLIDAE**

Genus ***CUNA*** Hedley, 1902

Cuna coxi Eames and Wilkins, 1957

C. coxi Eames and Wilkins 1957 : 199, pl. 27, fig. 1, 2, 3. Hudson, Eames and Wilkins, 1957 : 387

MATERIAL. Sta. 11, 1 valve; Western Khor, 1+4 valves.

The species was described from fossil material collected near Lake Hamar, Busra, Iraq. This is the first record of its occurrence in the Persian Gulf. Station 11 was in 70 ft of water. The specimen from the Western Khor shows some brown colour, the type is white.

Cuna majeeda n. sp.

(Pl. 6, fig. 5–8. Text-figs 7)

Shell very small, thin, triangular, equilateral, equivalve, chestnut-brown colour, ornamented with 10 relatively smooth radial ribs but which tend to become ornamented with small nodules near the ventral edge of the shell; interstices relatively smooth, not deep, as wide as the ribs; dorsal margin sharply angled at umbo; umbos medial and close set; internally the shell is smooth and shining chocolate-brown, the external ribbing shows through, margins fluted, no palial sinus; ligament not retained.

TYPE MATERIAL. HOLOTYPE B.M.(N.H.) Reg. no. 1968769, Western end Khor-al-Bazm. Length 1·6 mm, height 1·4 mm, width 0·6 mm.

PARATYPES B.M.(N.H.) Reg. nos. 1968770, 1968771, 1968773, Western end Khor-al-Bazm
B.M.(N.H.) Reg. no. 1968772, Sta 105
B.M.(N.H.) Reg. no. 1968778, Sta. 62.
B.M.(N.H.) Reg. no. 1968779, Eastern Khor.

The holotype is possibly juvenile and differs from the paratypes in being brown in colour, the latter are orange. Also in the paratypes there is a tendency for the ribs to bear heavy nodules and for the inter-spaces to be wider than the ribs. The range of rib count in the paratypes is 9–14 (mean 11). The largest paratype is 2·5 mm long and 2·3 mm high.

The equilateral shape of this species distinguishes it from the strongly inequilateral *C. coxi* also the ribs are closer than in *C. coxi*. The figure on plate 6, shows very clearly the difference in shape between *coxi* Eames and Wilkins and the proposed new species.

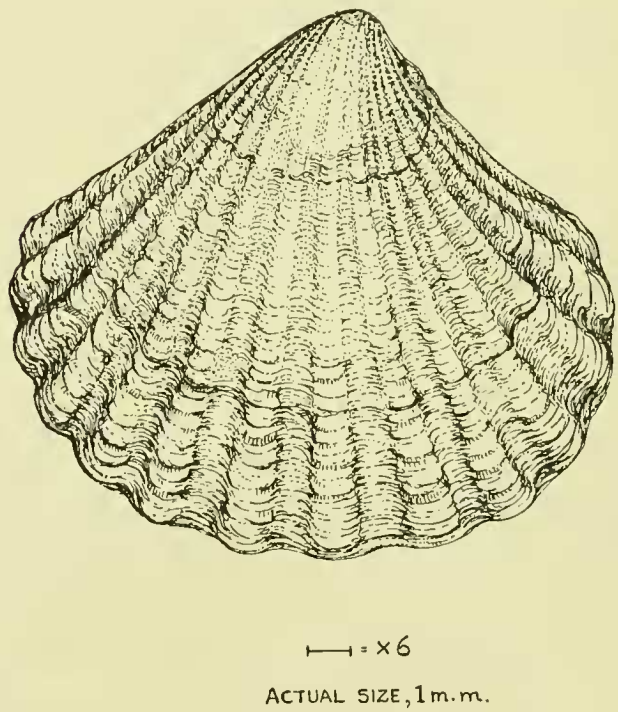
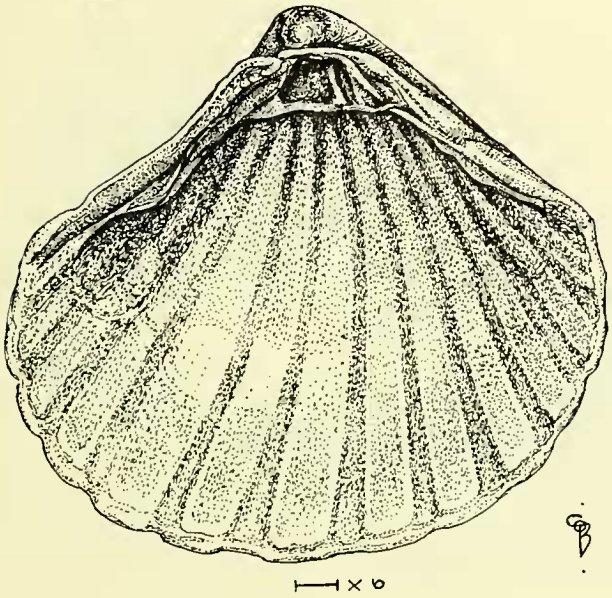
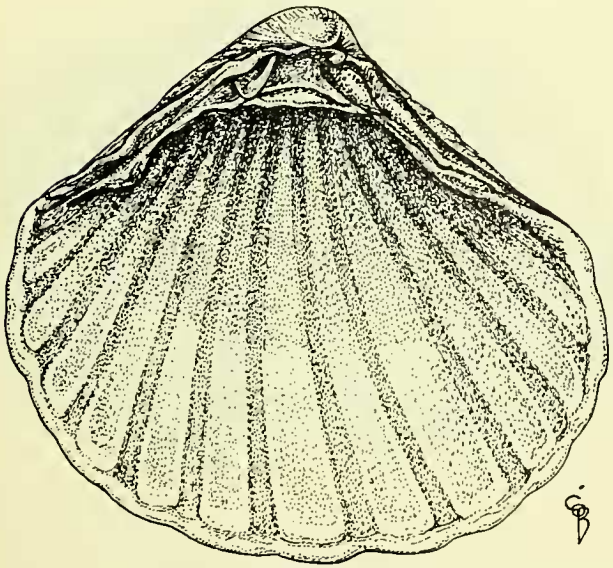


FIG. 7. *Cuna majeeda* n. sp. (A) left valve exterior.



(B) left valve interior.



(c) right valve interior.

Cuna sp.

MATERIAL. Western Khor, 1+1 valve.

Superfamily **CARDITACEA**

Family **CARDITIDAE**

Genus ***CARDITA*** Bruguière, 1792

Cardita antiquata (Linnaeus, 1758)

Chama antiquata Linnaeus, 1758 : 691.
Cardita antiquata Melvill and Abercrombie, 1893 : 28. Sturany, 1901 : 287. Melvill and Standen, 1907 : 812.

MATERIAL. Sta. 50, 3 valves; Sta. 54, 6 valves; Sta. 56, 32 valves; Sta. 58, 15 valves; Sta. 70a, 3 valves; unlocated, 6 valves.

The above determination is made with some reserve. Haas (1952 and 1954) reports the species *Cardita bicolor* Lamarck from the Trucial coast. Reeve (1843) makes *bicolor* Lamarck a synonym of *antiquata* Linnaeus. Melvill and Standen, (1928) reported *Cardita antiquata* (author in error) from Dabai in 8 fms but express doubts as to the determination.

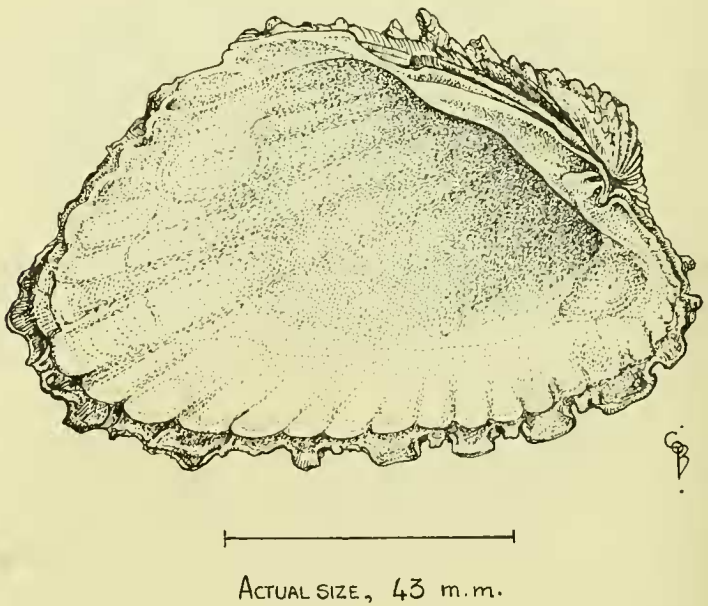
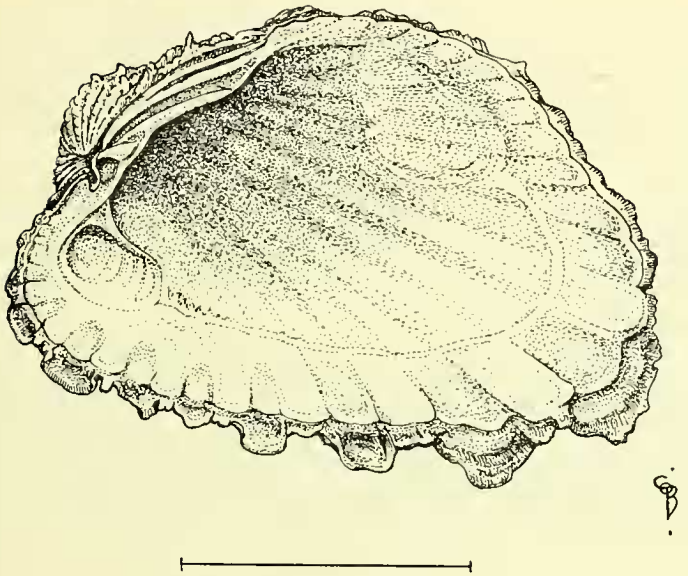
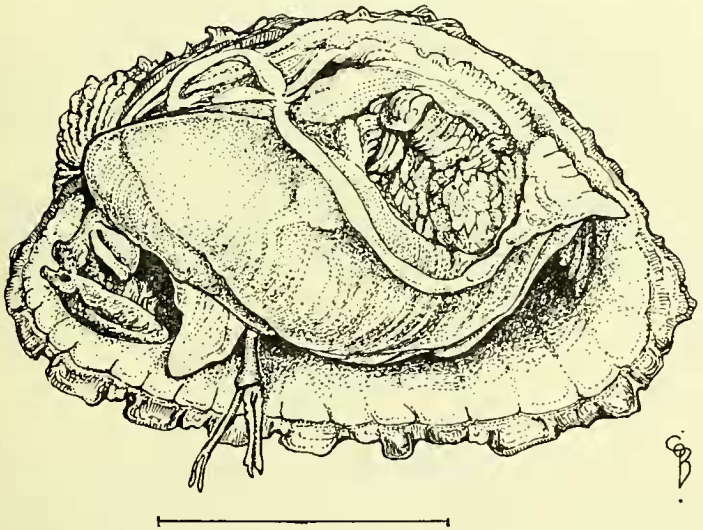


FIG. 8. *Cardita ffinchi* Melvill (A) left valve interior.



(B) right valve interior.



(C) lateral view with left valve and mantle removed to show general anatomical characters.

Cardita ffinchi (Melvill, 1898)

(Text-fig. 8)

Mytilicardia ffinchi Melvill, 1898 : pl. 2, fig. 17. Melvill and Standen, 1907 : 813.

MATERIAL. Sta. 10, 1 live.

The generic name *Mytilicardia* used by Melvill is perhaps a *lapsus calami* for *Mytilocardia* (Blainville) L. Agassiz which Thiele (1936) makes a synonym of *Mytilicardia* Anton 1839. This genus Thiele makes a subgenus of *Beguina* Röding 1798. As it appears that this species has not the shell form of *Beguina* I feel obliged to include *ffinchi* in *Cardita*.

The species is apparently quite rare, and a specimen in the B.M.(N.H.), Reg. no. 1899.12.27.122 from the type locality, Muscat was examined. This is a new record for the Persian Gulf and also the first live specimen recorded.

The type locality is Muscat 10 fms, on coral sand, the Trucial Coast specimen came from a depth of 50–88 ft 4 miles off the north coast of Jeziret al Yas, on the off-shore shelf where rock was exposed on the bottom. This specimen has a weak byssus and was possibly attached to the rock.

Superfamily **CYPRINACEA**

Family **TRAPEZIIDAE**

Genus ***TRAPEZIUM*** Muhlfeld, 1811

Trapezium sublaevigatum (Lamarck, 1819)

Cardita sublaevigata Lamarck, 1819 : 26.
Cypricardia vellicata Reeve, 1843 : sp. 7.
Libitina vellicata Melvill and Abercrombie, 1893 : 28. Melvill and Standen, 1907 : 814.
T. (*Neotrapezium*) *sublaevigatum* Solem, 1954 : 71.

MATERIAL. Eastern Khor, 1.

The above specimen is considerably larger than the type as figured by Solem (1955). Blair (unpublished) collected specimens 'within a mile or two of Bushire', apparently all dead, between 1914 and 1918 and these are now in the Liverpool Museum.

Superfamily **LUCINACEA**

Family **UNGULINIDAE**

Genus ***DIPLODONTA*** Bronn, 1831

Diplodonta raveyensis Sturany, 1901

D. rareyensis Sturany, 1901 : 285, pl. 6, fig. 8–11. Melvill and Standen, 1907 : 816.

MATERIAL. Sta. 105, 3 valves; Eastern Khor, 4 valves.

This is a new record for the Persian Gulf as Melvill and Standen (1906) recorded it for the Gulf of Oman and Makran Coast. One of the specimens from the Khor-al-

Bazm is rather larger than the type from the Red Sea (height 12·5 and 9·8 mm, breadth 13·0 and 10·4 mm respectively). As this is the opposite to the expected trend in the warmer and more saline waters of the Khor it is possible that Sturany's specimen is a juvenile.

Family **LUCINIDAE**

Genus ***PHACOIDES*** Blainville, 1825

Subgenus ***BELLUCINA*** Dall, 1901

Phacoides (Bellucina) semperiana (Issel, 1896)

Lucina semperiana Issel, 1869 : 82. Sturany, 1901 : 284. Cooke, 1886b : 99.
L. (Cyclas) semperiana Melvill and Standen, 1907 : 815.
P. semperiana Barnard, 1964 : 475.

MATERIAL. Eastern Khor, 1, 28 valves; Western Khor, 72 valves.

The above records are from deposits in the Khor, Melvill and Standen (1907) record the species from shell sand off Charbar Bay (Makran Coast) and from Bombay, in shell sand.

Genus ***DIVARICELLA*** Martens, 1830

Divaricella cumingi (Adams and Angus, 1863)

Lucina (Cyclas) cumingi Adams and Angus, 1863 : 426, pl. 37, fig. 20.
D. dalliana Biggs and Grantier, 1960 : 390

MATERIAL. Sta. 20, 2 valves; Sta. 50, 1 valve; Sta. 54, 2 valves; Sta. 55, 1 valve; Sta. 70A, 1 valve; unlocated, 2 valves.

None of the published lists for the Persian Gulf, Bombay or Aden has any reference to a species of *Divaricella*. Biggs and Grantier (1960) recorded *dalliana* Vanetta from Ras Tanura but Barnard (Personal communication) queried this determination. After re-examining this material I accept Barnard's view that *dalliana* is confined to South Africa.

Genus ***CTENA*** Morch, 1860

Ctena divergens (Philippi, 1850)

Lucina divergens Philippi, 1850 : 103, pl. 2, fig. 4. Fischer, 1891 : 230.
Codokia (Jagonia) divergens Moazzo, 1939 : 112.

MATERIAL. Sta. 97, 1; Sta. 20, 1 valve; Western Khor, 1 valve.

Kinsman (1964b) records the species as uncommon in the area of the lagoon between Halat-al-Bahrani and Abu Dhabi I.; Moazzo (1939) says it is rare in Suez Bay. The above sparce material seems to confirm the fact that it is a rare species.

Genus ***CODAKIA*** Scopoli, 1777

Subgenus ***JAGONIA*** Recluz, 1869

Codakia (Jagonia) fischeriana (Issel, 1869)

Lucina fischeriana Issel, 1869 : 104, pl. 1, fig. 8. Sturany, 1901 : 285. Shopland, 1902 : 178. Tomlin 1927 : 308.
Loripes fischerianus Moazzo, 1939 : 114.

Material. Sta. 62, 1 live+2+26 valves; Sta. 70, 2 valves; Sta. 58, 7 valves; Sta. 64, 1 valve; Eastern Khor, 13 valves; Western Khor, 87 valves.

Cook (1886b) records this species from the Persian Gulf but does not give the exact locality. The live specimen and one other valve are orange-pink, but the remainder are bleached.

Issel (1869) states that the margin of the shell is 'simple' but Cooke (1886b) states that it is dentated; the Persian Gulf specimens conform with Cooke's description but some of the worn specimens are smooth, which suggests that again Issel was describing a new species from beachworn specimens.

Genus ***ANODONTIA*** Link, 1807

Anodontia edentula (Linnaeus, 1758)

Venus edentula Linnaeus, 1758 : 689.
Lucina edentula Moazzo, 1939 : 110. Barnard, 1964 : 470.

Material. Western Khor, 1 specimen, 1 valve; unlocated, 5 valves.

This species has not previously been recorded for the Persian Gulf.

Superfamily **CHAMACEA**

Family **CHAMIDAE**

Genus ***CHAMA*** Linnaeus, 1758

Chama brassica Reeve, 1847

Chama brassica Reeve, 1847 : *b* : sp. 31. Biggs, 1958 : 275. Biggs and Grantier, 1960 : 390.

Material. Sta. 10, 1 valve; unlocalised 2, 1 juvenile.

The type locality was 'Philippines, under stones at low water'. Station 10 was on an 'exposed rock bottom' but at a good depth. Biggs (1958) records it on rocks at low water for Hormuz I. The distribution range in depth as well as its geographical range seem to be considerable.

Superfamily **CARDIACEA**

Family **CARDIIDAE**

Genus ***LAEVICARDIUM*** Swainson, 1840

Laevicardium papyraceum (Bruguière, 1789)

Cardium papyraceum Bruguière, 1789 : 260.
C. (*Papyridea*) *papyraceum* Melvill and Standen, 1907 : 839. Tomlin, 1927 : 305. Moazzo, 1939 : 64. Biggs and Grantier, 1960 : 391.
P. papyracea Barnard, 1964 : 494.

MATERIAL. Eastern Khor, 1 valve juvenile; many fragments; Western Khor, 2 valves juveniles.

Genus ***TRACHYCARDIUM*** Mörch, 1853

Trachycardium lacunosum (Reeve, 1845)

Cardium lacunosum Reeve, 1845, *2* : sp. 81.
C. (*T.*) *lacunosum* Melvill and Standen, 1907 : 837. Melvill, 1928 : 116.
T. lacunosum Biggs and Grantier, 1960 : 390.

MATERIAL. Sta. 8, 1 live; Sta. 9, 1+1 live; Sta. 13, 4 live; Sta. 50, 1 valve; Sta. 54, 5 valves; Sta. 56, 11 valves; Sta. 58, 13 valves; Sta. 70a, 7 valves; Eastern Khor, 1 valve; Western Khor, 1 valve; beach, 31 valves; unlocated, 16 valves.

Trachycardium maculosum (Wood, 1815)

Cardium maculosum Wood, 1815 : 218. Sturany, 1901 : 282.
C. (*T.*) *maculosum* Melvill and Standen, 1907 : 837. Melvill, 1928 : 116.

MATERIAL. Sta. 3, 1 live; Sta. 4, 1 live; Sta. 9, 1 live; Sta. 15, 1 live; Western Khor, 1 juvenile, 2 valves; Eastern Khor, fragments.

Genus ***PARCIVARDIUM*** Monterosato, 1884

Parvicardium sueziensis (Issel, 1869)

Cardium sueziensis Issel, 1869 : 76, 252, pl. 3, fig. 4.
Cardium (*?Acanthocardium*) *sueziense* Melvill and Standen, 1907 : 839.
Cardium (*Cerastoderma*) *sueziense* Tomlin, 1924 : 305. Moazzo, 1939 : 68.
Cardium (*Acanthocardium*) *sueziense* Melvill, 1928 : 116.

MATERIAL. Sta. 58, 1 valve; Sta. 70, 2 valves; Eastern Khor, 11 valves; Western Khor, 44 valves.

Only one shell from the Western Khor has the brown flecks referred to by Issel in his original description as 'castaneis notata', all the remainder are pure white. The only other specimen I have seen with flecks is in the Manchester Museum and came from the Red Sea.

Superfamily **VENERACEA**

Family **VENERIDAE**

Genus ***LIOCONCHA*** Mörch, 1853

Lioconcha picta (Lamarck, 1818)

Cytherea picta Lamarck, 1818 : 569.
L. picta Sturany, 1901 : 280. Melvill and Standen, 1907 : 830. Moazzo, 1939 : 80.

MATERIAL. Western Khor, 2 valves juvenile.

This is the first record for the Persian Gulf, Melvill and Standen recorded it for Muskat and Karachi.

Genus ***GAFRARIUM*** Röding, 1798

Gafrarium arabicum (Lamarck, 1818)

Cytherea arabica Lamarck, 1818 : 571.
Cytherea (*Lioconcha*) *arabica* Issel, 1869 : 65.
Meretrix (*L.*) *arabica* Fischer, 1891 : 229.
L. arabica Sturany, 1901 : 280. Melvill and Standen, 1907 : 830. Moazzo, 1939 : 79.
G. arabicum Tomlin, 1927 : 306.
Circe arabica Biggs and Grantier, 1960 : 391.

MATERIAL. Beach, 1+10 valves; Sta. 70, 17+1 valve; Sta. 90, 1 live; Sta. 95, 5 live.

Gafrarium dispar (Dillwyn, 1817)

Venus dispar Dillwyn, 1817 : 199.
Cytharea (*Crista*) *dispar* Issel, 1869 : 65.

MATERIAL. Sta. 47, 1 live, juvenile.

This is a new record for the Persian Gulf. The specimen was found in a cora crevice.

Gafrarium pectinatum (Linnaeus, 1758)

Venus pectinatum Linnaeus, 1758 : 689.
Crista pectinata Sturany, 1901 : 280. Melvill and Standen, 1907, 831. Moazzo, 1939 : 80.
G. pectinatum Tomlin, 1927 : 306, 316. Barnard, 1964 : 502.
G. (*Circe*) *pectinatum* Spry, 1964 : 32.

MATERIAL. Eastern Khor, 1 live.

This specimen was attached to seaweed.

Genus ***CIRCE*** Schumacher, 1817

Circe (Circe) intermedia Reeve, 1863

C. intermedia Reeve, 1863, *14* : sp. 26. Shopland, 1902 : 178.
Gafrarium intermedia Biggs and Grantier, 1960 : 391.

MATERIAL. Sta. 10, 1 live.

Little seems to be known of the distribution of this species. Reeve, in his original description, gives no locality for the type, but someone had written in pencil on the B.M.(N.H.) copy of Reeve, 'Hab. Aden, (Yerbury)'. The above record is from fairly deep water, 16 m to 30 m and 4 miles north of Jeziret al Yas.

The measurements are length 38 mm and height 33 mm. The ligament is only 7 mm long and rather weak. The adductor muscles are nearly equal in size so approximating to *Circe arabicum* (Lamarck) rather than *Circe scripta* (Linnaeus); in specimens of the latter examined from the Trucial Coast the two muscles are unequal in size. Cooke (1886) reports the species from habitats 2–10 fathoms for Suez Bay.

Circe (Circe) scripta (Linnaeus, 1758)

Venus scripta Linnaeus, 1758 : 689.
C. scripta Issel, 1869 : 71, 251. Sturany, 1901 : 280. Melvill and Standen, 1907 : 831. Moazzo, 1939 : 78. Barnard, 1964 : 501. Spry, 1964 : 31.
C. (C.) scripta Haas, 1952 : 116.
Gafrarium (C.) scripta Haas, 1954 : 48.
G. scripta Biggs and Grantier, 1960 : 391.

MATERIAL. Sta. 9, 3 live, juvenile; Sta. 13, 1; Sta. 54, 1; Sta. 103, 2 live; Sta. 105, 1 juvenile; Eastern Khor, 1, 2 valves; Western Khor, 1+8 valves; Sta. 7, 1 valve.

This species was found on the off shore shelf (Sta. 9) and inshore (Sta. 103).

Subgenus ***PARMULOPHORA*** Dall, 1915

Circe (Parmulophora) corrugata (Dillwyn, 1817)

Venus corrugata Dillwyn, 1817 : 201.
C. corrugata Issel, 1869 : 71, 360. Sturany, 1901 : 280. Melvill and Standen, 1907 : 831. Tomlin, 1927 : 306. Moazzo, 1939 : 76.
C. (P.) corrugata Spry, 1964 : 31.

MATERIAL. Sta. 54, 2; Sta. 56, 1; unlocated, 1; Eastern Khor, 10 valves juvenile; Western Khor, 6 valves juvenile.

This species is reported by Kinsman (1964b) as being uncommon on the shelf but I have collected the species in abundance in sand in Suez Bay and in Lake Timsah on the canal.

Genus *DOSINIA* Scopoli, 1777

Dosinia alta (Dunker, 1848)

Artemisia alta Dunker, 1848 : 184.
Artemis alta Issel, 1869 : 72.
D. alta Melvill and Standen, 1907 : 835. Moazzo, 1939 : 85. Biggs, 1958 : 275. Biggs and Grantier, 1960 : 391.

MATERIAL. Sta. 56, 2 valves; Sta. 58, 1 valve juvenile.

Dosinia hepatica (Lamarck, 1818)

Cytherea hepatica Lamarck, 1818 : 572.
D. hepatica Melvill and Standen, 1928 : 511. Moazzo, 1939 : 83. Barnard, 1964 : 511.

MATERIAL. Eastern Khor, 1 valve juvenile; Western Khor, 1 valve juvenile.

Dosinia histrio (Gmelin, 1791)

Venus histrio Gmelin, 1791 : 3287.
D. histrio Sturany, 1901 : 282. Melvill and Standen, 1907 : 835. Moazzo, 1939 : 84.

MATERIAL. Western Khor, 1 live, 13 valves and fragments.

Dosinia spp.

MATERIAL. Sta. 70, 1; Sta. 67, 1.

Both these specimens are juveniles hence the hesitation in referring them to a species.

Genus *BASSINA* Jukes-Browne, 1914

Bassina calophylla Philippi, 1836

Venus calaphylla Philippi, 1836 : 229, pl. 8, fig. 2.
Anaitis calophylla Melvill and Standen, 1907 : 833.

MATERIAL. Western Khor, 1 live, 32 valves and fragments.

According to the measurements given by Philippi in his description of the species all the specimens from the Khor-al-Bazm must either be juveniles or a small race of the species.

Genus *TIMOCLEA* Brown, 1827

Timoclea farsiana n. sp.

(Pl. 6, figs 1–4. Text-fig. 9)

Shell small, rather thin, equivalve, inequilateral, contracted posteriorly, anterior margin evenly rounded, posterior margin forming a truncated obtuse angle; shell colour externally creamy white with irregular dull purple-brown maculations,

internally milky white with purple-brown maculations; sculpture—about 13 parallel, sharp-edged, upturned costae which are interrupted somewhat where they are crossed by the radiating ribs on the anterior half of the shell but these ribs are dominant over the costae and continuous on the posterior end where they also bear foliations. Prodissoconch more or less smooth but with incipient radiating ridges. Interior margin of the shell strongly crenulate. Teeth, 3 cardinals in each valve. Lunule moderately broad, brownish purple with thin radiating ribs. Ligaments unknown. Escutcheon long, ovate and relatively smooth. Animal unknown.

Type material. Holotype B.M.(N.H.) Reg. No. 1968774 Khor-al-Bazm, Trucial Coast, Persian Gulf. Length 6·3 mm, height 4·6 mm.

Material collected, Eastern Khor-al-Bazm, 34 valves, Western Khor-al-Bazm, 204 valves.

This species is intermediate between *Timoclea arakana* Nevill and *Timoclea macfadyeni* Dance and Eames. From the former it differs by being considerably smaller and by the costae being sharp-edged and upturned; from the latter it differs by having the costae placed relatively further apart and not being rounded but turned up, in general shape by being oval.

There is considerable variation in the number and spacing of the costae; in three examples from the Western Khor there is a proliferation of the costae by the interposition of smaller costae between the larger ones towards the ventral edge. A number of unidentified specimens in the British Museum (Natural History) from Muscat, Gulf of Oman (Winckworth Collection) may be large specimens of this species. I have also examined a sample from shallow water southern end of Qatar Peninsular (Biggs collection). The largest paratype is 9·5 mm long and 6·75 mm high.

Genus ***AMIANTIS*** Carpenter, 1864

Amiantis erycina (Linnaeus, 1758)

Venus erycina Linnaeus, 1758 : 686.
Callista erycina Melvill and Standen, 1904 : 829.
Macrocallista (*Paradione*) *erycina* Haas, 1952 : 116.
Pitaria (*M.*) *erycina* Biggs and Grantier, 1960 : 391.

Material. Sta. 56, 1 valve juvenile; 4 valves.

The above is all worn material, juveniles of this species and the adults of the following species are sometimes difficult to distinguish.

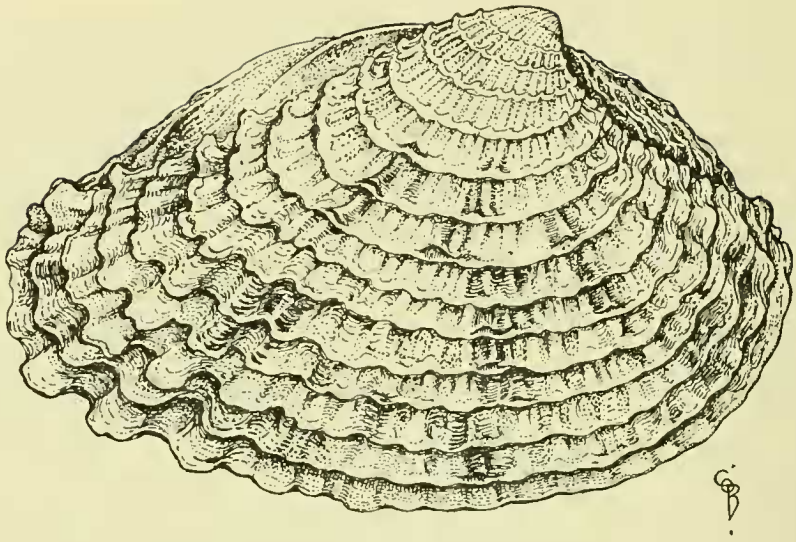
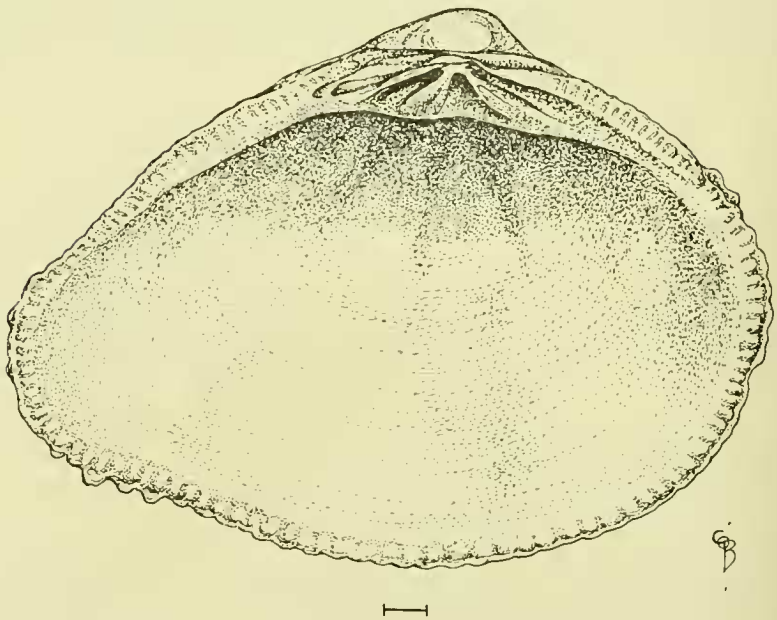
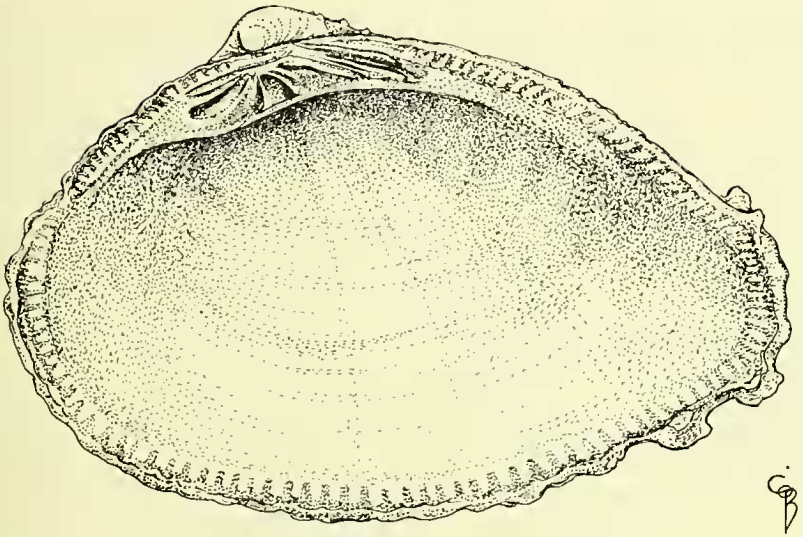


FIG. 9. *Timoclea farsiana* n. sp. (A) right valve exterior.



(B) left valve interior.



(c) right valve interior.

Amiantis hagenowi (Dunker, 1849)

Cytherea hagenowi Dunker, 1849 : 184.
Cytherea (*Callista*) *Hagenowi* Issel, 1869 : 69.
Callista hagenowi Melvill and Standen, 1907 : 829.

MATERIAL. Eastern Khor, 33 valves; Western Khor, 22 valves.

The Melvill and Standen record is for Dubai on the Trucial Oman Coast, it has not yet been recorded for farther north. Most of the valves here recorded are juveniles and some reserve in accepting this determination is necessary as they may be juveniles of the previously recorded species.

Genus ***SUNETTA*** Link, 1807

Sunetta effossa (Hanley, 1842)

Cytherea effosa Hanley, 1842 : 123.
S. effosa Melvill and Abercrombie, 1893 : 45. Melvill and Standen, 1907 : 831. Biggs and Grantier, 1960 : 391.

MATERIAL. Western Khor, 7 live.

These live specimens were collected near the western end of the Khor-al-Bazm in the intertidal zone on a sandbank. Kendall (personal communication) comments that specimens of this species 'kept popping up from the sand as I walked'.

Sunetta spp.

MATERIAL. Sta. 55, 1 valve; Sta. 58, 5 valves; unlocated (on Es Sa'diyat I.) 1 valve.

Genus ***MERETRIX*** Lamarck, 1799

Meretrix meretrix (Linnaeus, 1758)

Venus meretrix Linnaeus, 1758 : 686.
Cytherea zonaria Lamarck, 1818 : 562.
M. zonaria Melvill and Standen, 1907 : 829.
M. meretrix Biggs and Grantier, 1960 : 391.

MATERIAL. Sta. 62, 3 live, 2 juveniles; Sta. 83, 4 live; Sta. 88, 2 live juvenile; Sta. 95, 4 live juvenile; Eastern Khor, 1 valve; beach, 50 valves.

Genus ***TIVELA*** Link, 1807

Tivela ponderosa (Koch in Philippi, 1844)

Cytherea ponderosa Koch, 1844 : 149.
T. ponderosa Sturany, 1901 : 279. Melvill and Standen, 1907 : 828. Haas, 1952 : 116.

MATERIAL. Sta. 54, 3 valves; Sta. 56, 1 fragment.

Genus ***KATELYSIA*** Romer, 1857

Katelysia marmorata (Lamarck, 1818)

Venus marmorata Lamarck, 1818 : 600.
Tapes (Hemitapes) marmorata Melvill and Standen, 1907 : 833.

MATERIAL. Sta. 9, 1 live.

This is a new record for the Persian Gulf as that of Melvill and Standen (1907) was for Bombay where it was taken on mud at low tide. This specimen was found in deep water 3 miles north of Jeziret el Yas.

Genus ***IRUS*** Schmidt, 1818

Irus irus (Linnaeus, 1758)

Donax irus Linnaeus, 1758 : 683.
Venerupis macrophylla Deshayes, 1853 : pl. 18, fig. 8, Cooke, 1886b : 103. Sturany, 1901 : 282. Melvill and Standen, 1907 : 836.
V. irus Tomlin, 1927 : 315.
Notirus macrophylla Taylor, 1968 : 204.

MATERIAL. Eastern Khor, 1 valve.

This is a new record for the Persian Gulf. The relationship between this species and *I. macrophylla* Deshayes has been referred to on a number of occasions. Smith

(1891) recording the species for Aden says '*V. macrophylla* and *V. irus* are certainly identical'. Sturany reporting on the Red Sea equates the two species, Cooke (1886b) although using the name *macrophylla* notes 'These Suez shells are quite undistinguishable from the familiar *irus* L . . .' Tomlin (1927) records *Venerupis irus* Linnaeus on his list of species common to both the Mediterranean and Red Seas. This species inhabits cavities in rocks and tends to vary with the type of rock in which it bores.

Superfamily **MACTRACEA**

Family **MACTRIDAE**

Genus ***MACTRA*** Linnaeus, 1767

Mactra olorina Philippi, 1846

M. olorina Philippi, 1846 : 72, pl. 2, fig. 2. Issel, 1869 : 52, 357. Fischer, 1891 : 229. Sturany, 1901 : 247, 276. Tomlin, 1924 : 308. Melvill, 1928 : 116. Moazzo, 1939 : 103, pl. 9, fig. 3, pl. 10, fig. 2. Hudson, Eames and Wilkins, 1957 : 397.

MATERIAL. Sta. 50, 3 valves; Sta. 54, 11 valves; Sta. 55, 3 valves; Sta. 56, 37 valves; Sta. 58, 38 valves; Sta. 70a, 18 valves; Eastern Khor, 1 valve; Western Khor, 1 valve; beach, 51 valves.

After examination of material from the Persian Gulf and South Arabian coast it appears that there is a species complex involving *olorina* Lamarck, *furoti* Jousseaume, *lilacina* Lamarck and according to Moazzo (1939) *isthmia* Jousseaume. I have tentatively placed all the specimens under *olorina* but the problem needs further study.

Superfamily **TELLINACEA**

Family **GARIIDAE**

Genus ***ASAPHIS*** Modeer, 1793

Asaphis deflorata (Linnaeus, 1758)

Venus deflorata Linnaeus, 1758 : 687.
A. violascens Sturany, 1901 : 277.
A. violasescens Issel, 1869 : 56.
A. deflorata Melvill and Standen, 1907 : 842. Moazzo, 1939 : 97 Biggs and Grantier, 1960 : 391.
A. (A.) deflorata Haas, 1954 : 48.

MATERIAL. Sta. 90, 1 live; beach, 8 valves.

Kinsman (1964b) reports that this species is very common on the off-shore shelf.

Family **PSAMMOBIIDAE**

Genus ***SOLECURTUS*** Blainville, 1824

Solecurtus australis (Dunker, 1861)

Macha australis Dunker, 1861 : 424.
Solenocurtus (*Macha*) *australis* Moazzo, 1939 : 100.
Solecurtus strigilatus Biggs and Grantier, 1960 : 392.

MATERIAL. Western Khor, 2 valves, damaged.

The *Solecrutus strigilatus* Linnaeus recorded by Biggs and Grantier (1960) is this species. Issel (1869) reports *S. strigilatus* (Linnaeus) from Suez Bay based on material collected before the opening of the Suez Canal, it is possible that this was an error for the present species as Moazzo (1939) records *australis* in Suez Bay.

Family **TELLINIDAE**

Genus ***TELLINA*** Linnaeus, 1758

Subgenus ***ARCOPAGINULA*** Lamy, 1918

Tellina* (*Arcopaginula*) *inflata Gmelin, 1891

(Text-fig. 10)

Tellina inflata Gmelin, 1791 : 3230.
Tellina (*Tellinella*) *inflata* Melvill and Standen, 1907 : 819.
Tellina (*A.*) *inflata* Moazzo, 1939 : 118.

MATERIAL. Sta. 3, 1 live; Sta. 5, 1+3 valves; Sta. 7, 1+3 valves.

This is a new record for the Persian Gulf. It was reported from Muscat, 10 fm mud, by Melvill and Standen (1907). The specimen from station 3 was gravid (see figure), it was taken in December or January when the temperature of the water was 21°C (70°F) on the bottom and the salinity 43‰ to 48‰.

FIG. 10. *Arcopagia* (*Arcopaginula*) *inflata* Gmelin lateral view with right valve and mantle removed to show general anatomical characters.

Subgenus ***ARCOPAGIA*** Brown, 1827

Tellina (Arcopagia) isseli (H. Adams, 1870)

Tellina (*Arcopagia*) *isseli* H. Adams, 1870 : 790, pl. 48, fig. 10. Melvill and Standen, 1970 : 821. Moazzo, 1939 : 118.

Material. Sta. 11, 1.

Subgenus ***PISTRIS*** Thiele, 1934

Tellina (Pistris) pristis Lamarck, 1818

T. pristis Lamarck, 1818 : 531.
T. (*P.*) *pristis* Moazzo, 1939 : 119.

Material. Western Khor, 1 live.

Another new record for the Persian Gulf. Unfortunately the only specimen collected was badly broken when received.

Subgenus ***PINGUITELLINA*** Iredale, 1927

Tellina (Pinguitellina) robusta Hanley, 1844

T. robusta Hanley, 1844 : 63.
Arcopagia (*P.*) *robusta* Biggs, 1965 : 339.
P. robusta Taylor, 1968 : 204.

Material. Eastern Khor, 5+102 valves; Western Khor, 3+75 valves; Sta. 7, 3 valves.

Genus ***EXOTICA*** Lamy, 1918

Subgenus ***JACTELLINA*** Iredale, 1929

Exotica (Jactellina) rhomboides (Quoy and Gaimard, 1835)

Tellina rhomboides Quoy and Gaimard, 1835 : 502.
T. (*Moera*) *rhomboides* Melvill and Standen, 1907 : 820.

Material. Western Khor, 1 live, 6 valves; Eastern Khor, 1; unlocated, 3 valves.

This is the first record for the species in the Persian Gulf, Melvill and Standen record the species from Muskat, Gulf of Oman. The live specimen from the Khor-al-Bazam is greenish white in colour with pinkish maculations which appear to be the remains of five rays, there is one specimen from Japan in the collection of the B.M.(N.H.) showing similar markings. The costae near the ventral edge and the diagonal striations on the centre of the shell are very close.

Genus ***MACOMA*** Leach, 1819

Macoma arsinoensis (Issel, 1869)

Tellina (M.) arsinoensis Issel, 1869 : 59.
T. arsinoensis Cooke, 1886b : 106.
T. (Angulus) arsinoensis Moazzo, 1939 : 120.

MATERIAL. Sta. 59, 1 live juvenile; Western Khor, 1 live juvenile, 20 valves; Eastern Khor, 1 live.

The type series from Suez Bay measured length 13–17 mm, breadth 9·5–12·25 mm while the largest of the above sample is 11·3 mm in length, 8·3 mm in breadth.

Macoma jeanae Dance and Eames, 1966

Macoma jeanae Dance and Eames, 1966 : 36, pl. 4. fig. 1, 2.

MATERIAL. Eastern Khor, 1, 2 valves; Western Khor, 14 valves.

The species was described from a single valve from alluvium at 16 ft at Gaumat Ali in S.E. Iraq. The dimensions of the type are length 3·3 mm, height 2·3 mm while the range of the above sample is length 6·8–9·8 mm, height 4·0–5·3 mm. Mr Dance identified some of the above Trucial coast specimens.

Genus ***TELLIDORA*** H. and A. Adams, 1856

Tellidora pellyana H. Adams, 1873

T. pellyana H. Adams, 1873 : 208, pl. 23, fig. 14, Melvill and Standen, 1907 : 824.

MATERIAL. Sta. 3, 1 valve juvenile; Sta. 7, 2 valves juveniles; Eastern Khor, 2 valves; Western Khor, 10 valves.

Originally described from the Persian Gulf, Melvill and Standen (1907) record the species from Karachi. Haas (1952) records *Tellidora* sp. from Dukhan on the Qatar Peninsular which may well be this species. It is apparently rare and of very limited distribution.

Superfamily **SOLENACEA**

Family **SOLENIDAE**

Genus ***CULTELLUS*** Schumacher, 1817

Cultellus cultellus (Linnaeus, 1758)

Solen cultellus Linnaeus, 1758 : 673.
C. cultellus Sturany, 1901 : 276. Melvill and Standen, 1907 : 844. Moazzo, 1939 : 99.

MATERIAL. Sta. 7, 1 valve.

Superfamily **MYACEA**

Family **CORBULIDAE**

Genus ***CORBULA*** Lamarck, 1799

Corbula acutangula Issel, 1869

C. acutangula Issel, 1869 : 246, pl. 5, fig. 1.

MATERIAL. Western Khor, 1, juvenile, 11 valves.

This is a new record for the Persian Gulf. No exact locality was given for the type which is a sub-fossil specimen from a raised beach.

Corbula modesta Hinds in Reeve, 1843

C. modesta Hinds in Reeve, 1843, *2* : Sp. 14. Hinds, 1843 : 57. Melvill and Abercrombie, 1893 : 83. Melvill and Standen, 1907 : 843.

MATERIAL. Western Khor, 1 valve.

Corbula subquadrata Melvill, 1907

C. subquadrata Melvill and Standen, 1907 : 843, pl. 61, fig. 7, 7a. Melvill, 1928 : 117. Taylor, 1968 : 205.

MATERIAL. Eastern Khor, 1; Western Khor, 6+30 valves.

Although the figure given by Melvill (1907) shows a more compact shell than those from the Khor-al-Bazm they conform well to specimens in the B.M.(N.H.) from Madras (Winckworth) and Bombay (Piele).

Superfamily **GASTROCHAENACEA**

Family **GASTROCHAENIDAE**

Genus ***GASTROCHAENA*** Spengler, 1783

Gastrochaena cuneiformis Spengler, 1783

G. cuneiformis Spengler, 1783 : 179, pl. 1, fig. 8-11. Moazzo, 1939 : 108. Barnard, 1964 : 562. Taylor, 1968 : 205.

MATERIAL. Sta. 65, 3 live; Sta. 104, 1 live; Western Khor, 1.

This species was found boring in limestone (Station 104) and in coral clumps (Station 65), Moazzo (1939) reports it in Suez Bay boring in coral.

DISCUSSION

The conditions on the Trucial Coast, particularly in the inner lagoon areas, provide habitats with a wide range of temperatures and salinities (see Murray 1965, 1966). The variation in habitat, form and conditions makes this an interesting area for study as associated with these features are found many morphologically variable populations in a wide variety of taxa.

Kinsman (1964) has shown that on the reef north of Abu Dhabi certain corals survived temperatures and salinities previously regarded as lethal.

The collections were made primarily for geological study and hence are not random which would account for the absence of certain groups and the presence of large numbers of small gastropods and bivalves. The most common species in general collecting is *Cerithium scabridum* and eleven of the twenty most common gastropods belong to the Cerithiacea.

The most common bivalves in order of frequency are, *Glycymeris striatularis*, *Brachidontes variabilis*, *Pinctada radiata*, and *Tellina robusta*.

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My thanks are also due to Dr E. Binder of Geneva for the photograph of *Murex turbinatus* Lamarck, Lamarck's type which is in his care and also for permission to reproduce the same. To Dr Myra Keen for much help and advice on taxonomy (especially with regard to Tellinacea); to Dr Rosewater for help with *Nodilittorina;* and Dr Robert Robinson for help with *Tricolia*, my thanks for guidance.

LIST OF SPECIES IN TAXONOMIC ORDER

Listed below are the species here reported plus those recorded by Melvill and Standen (1901, 1907, 1928) and Haas (1952, 1954) for the Trucial Coast. No attempt has been made to revise the nomenclature of the latter. As difficulty was found in tracing the references of some species recorded by Haas some dates have been omitted.

*—Recorded by Melvill and Standen only.
†—Recorded by Melvill and Standen and the author.
‡—Recorded by Haas only.
§—Recorded by Haas and the author.

Class *LORICATA*

Family **ISHNOCHITONIDAE**
Ishnochiton yerburyi Smith 1891

Family **CHITONIDAE**
Chiton sp.

Class *GASTROPODA*

Superfamily **ZEUGOBRANCHIA**
Family **FISSURELLIDAE**
Emarginula planulata A. Adams, 1851
Diodora funiculata (Reeve, 1850)§
Diodora imbricata (Sowerby, 1862)

Superfamily **TROCHACEA**
Family **TROCHIDAE**
Euchelus angulus Pease, 1867
Euchelus asper (Gmelin, 1791)
Euchelus bicinctus (Philippi, 1849)
Turcica (*Perrinia*) *stellata* A. Adams, 1863
Trochus (*Infundibulops*) *erythraeus* Brocchi, 1821
Trochus (*Infundibulops*) *cariniferus* Beck in Reeve, 1842‡
Gibbula (*Enida*) *townsendi* Sowerby, 1895
Gibbula pulcherrima A. Adams, 1854*
Minolia gradata Sowerby, 1895
Minolia holdswothiana (G. and H. Nevill, 1871)
Minolia variabilis A. Adams, 1873
Minolia (*Priotrochus*) *obscura* (Wood, 1828)
Umbonium vestiarium (Linnaeus, 1758)†

Family **CYCLOSTREMALIDAE**
Cyclostrema quadricarinatum Melvill, 1907

Family **TURBINIDAE**
Turbo coronatus Gmelin, 1791§
Turbo radiatus Gmelin, 1791§
Tricolia fordiana (Pilsbry, 1888)
Phasianella solidula (Born, 1778)

Superfamily **NERITACEA**
Family **NERITIDAE**
Nerita plexa Chemnitz‡ (= *textilis* Dillwyn)
Smaragdia rangiana (Récluz, 1841)

Family **PHENACOLEPADIDAE**
Phenacolepas evansi n.sp.
Phenacolepas omanensis n.sp.

Superfamily **LITTORINACEA**
Family **LITTORINIDAE**
Nodilittorina subnodosa (Philippi, 1847)

Superfamily **RISSOACEA**
Family **HYDROBIIDAE**
Iravadia trochlearis (Gould, 1861)

Family **RISSOIDAE**
Rissoina distans (Anton, 1839)
Rissoina savigny Jousseaume
Rissoina (*Phosinella*) *sequenziana* (Issel, 1869)

Superfamily **CERITHIACEA**
Family **TURRITELLIDAE**
Turritella auricincta v. Martens, 1882
Turritella fascialis Menke, 1828
Turritella illustris Melvill, 1904*
Turritella (*Haustator*) *maculator* (Reeve, 1849)‡

Family **PLANAXIDAE**
Planaxis sulcatus (Born, 1792)

Family **POTAMIDIDAE**
Cerithidea cingulatus (Gmelin, 1791)
Pirenella conica (Blainville, 1829)
Terebralia palustris (Bruguière, 1792)

Family **FINELLIDAE**
Finella pupoides (A. Adams, 1860)
Finella reticulata (A. Adams, 1860)
Finella scabra (A. Adams, 1860)
Scaliola arenosa A. Adams, 1862
Scaliola bella A. Adams, 1860
Scaliola elata Semper in Issel, 1869

Family **CERITHIIDAE**
Diala semistriata (Philippi, 1849)
Diala cf. *hardyi* Melvill, 1895
Bittium (*Bittium*) *caudatum* Melvill, 1904
Bittium (*Bittium*) *tricarinatum* (Pease, 1860)‡
Cerithium caerulaeum Sowerby, 1865
Cerithium echinatum (Lamarck, 1822)‡
Cerithium petrosum (Wood, 1828)
Cerithium rugosum (Wood, 1828)
Cerithium scabridum Philippi, 1848
Cerithium sp.
Clypeomorus clypeomorus Jousseaume‡
Clava (*Clava*) *fasciata* (Brugnière, 1792)
Clava (*Clava*) *kochi* (Philippi, 1848)

Family **TRIPHORIDAE**
Triphora acuta Kiener, 1841–2.
Triphora sp.

Superfamily **CALYPTRAEACEA**
Family **CALYPTRAEIDAE**
Calyptraea pellucida (Reeve, 1859)
Calyptraea (*Crucibulum*) *violacea* (Carpenter, 1856)‡

Superfamily **STROMBACEA**
Family **XENOPHORIDAE**
Xenophora caperata Philippi, 1849
Xenophora corrugata (Reeve, 1843)

Family **STROMBIDAE**
Terebellum terebellum (Linnaeus, 1758)
Strombus decorus persicus Swainson, 1821
Strombus sp.

Superfamily **NATICACEA**
Family **NATICIDAE**
Natica lineata Link, 1807
Natica sp.
Sinum (*Eunaticina*) *papilla* (Gmelin, 1791)
Polinices (*Polinices*) *manilla* (Linnaeus, 1758)‡
Polinices (*Neverita*) *ampla* (Gmelin, 1891)‡

Superfamily **CYPRAEACEA**
Family **CYPRAEIDAE**
Cypraea caurica Linnaeus, 1758§
Cypraea grayana Schilder, 1930
Cypraea fimbriata Gmelin, 1791*
Cypraea lentiginosa Gray, 1825
Cypraea turdus Lamarck, 1810§
Erronea (*Melicerona*) *felina* (Gmelin, 1791)‡
Notocypraea pulicaria (Reeve, 1846)‡

Superfamily **DOLIACEA**
Family **CYMATIIDAE**
Cymatium (*Gutturnium*) *sarostoma* Reeve, 1844*

Family **BURSIDAE**
Bursa rubeta (Linnaeus, 1758)*
Cymatium ranzanii (Bianconi, 1850)‡

Superfamily **MURICACEA**
Family **MURICIDAE**
Rapana bulbosa (Solander) [Dillwyn, 1817]§
Chicoreus (*Chicoreus*) *anguliferus* (Lamarck, 1822)‡
Hexaplex (*Hexaplex*) *turbinatus* (Lamarck, 1822)‡
Murex küsterianus Tapparoni Canefri 1875
Murex scolopax Dillwyn, 1817
Murex (*Ocenebra*) *flexirostris* Melvill, 1898*
Murex (*Murex*) *ternispina* Lamarck, 1822‡
Thais carinifera (Lamarck, 1822)§
Thais pseudohippocastanum (Deutzenberg, 1929)
Thais tissoti (Petit, 1852)
Drupa margariticola (Broderip, 1798)
Drupa (*Morula*) *concatenata* (Lamarck, 1822)‡
Drupa (*Morula*) *siderea* (Reeve, 1846)‡

Superfamily **BUCCINACEA**
Family **COLUMBELLIDAE**
Mitrella (*Mitrella*) *cartwrighti* (Melvill, 1897)
Pyrene atrata (Gould, 1860)
Pyrene phaula (Melvill and Standen, 1901)

Family **NASSARIIDAE**
Nassarius pullus (Linnaeus, 1758)
Nassarius stigmarius (A. Adams, 1852)
Nassarius (*Hebra*) *echinatus* (A. Adams, 1851)*
Nassa (*Nassa*) *persica* von Martens‡

Family **FASCIOLARIIDAE**
Fusinus townsendi (Melvill, 1899)
Fusus (*Fusus*) *colus* (Linnaeus, 1758)‡

Family **FASCIDARIIDAE**
Latirus arabicus Melvill, 1898*
Latirus (*Peristernia*) *corallinus* Melvill, 1898*

Superfamily **VOLUTACEA**
Family **OLIVIDAE**
Ancilla castanea (Sowerby, 1830)‡
Ancilla cinnamomea (Lamarck, 1801)§
Ancilla eburnea (Deshayes, 1830)
Oliva bulbosa (Röding, 1798)
Oliva caerulea (Röding, 1798)
Oliva (*Oliva*) *elegans elegans* Lamarck, 1811‡
Oliva (*Carmione*) *inflata* Lamarck, 1811‡
Oliva (*Oliva*) *ispidula* (Linnaeus, 1758)‡
Family **MITRIDAE**
Mitra (*Scabricola*) *bovei* Kiener, 1839
Family **MARGINELLIDAE**
Persicula cf. *asellina* (Jousseaume, 1875)
Persicula mazagonica (Melvill, 1893)
Persicula shoplandi (Melvill, 1897)
Persicula subflava (Preston, 1906)
Marginella (*Gibberula*) *charbarensis* Melvill, 1897*
Superfamily **CONACEA**
Family **CONIDAE**
Conus generalis Linnaeus, 1758*
Conus quercinus Lightfoot, 1786*

Sub-Class *OPISTHOBRANCHIA*
Superfamily **AGLOSSA**
Family **MELANELLIDAE**
Strombiformis bivittata H. and A. Adams,*
Family **STILIFERIDAE**
Mucronalia lepida Melvill, 1906
Superfamily **PTENOGLOSSA**
Family **PYRAMIDELLIDAE**
Eulimella kaisensis Melvill, 1898
Turbonilla iclea Melvill, 1911
Turbonilla (*Tropaeas*) *ruppelli* Jickeli, 1882‡
Superfamily **CEPHALASPIDAE**
Family **ACTEONIDAE**
Solidula sp.
Family **RINGICULIDAE**
Ringicula propinquans Hinds, 1844
Family **BULLARIIDAE**
Bullaria ampulla (Linnaeus, 1758)§
Family **ATYIDAE**
Atys cylindricus (Helbling, 1779)
Family **RETUSIDAE**
Retusa omanensis Melvill and Standen, 1903
Family **AGLAJIDAE**
Aglaja cf. *nigra* (von Martens, 1879)

Order ACOELA
Superfamily **DORIDACEA**
Family **DORIDIDAE**
Casella atromarginata (Cuvier, 1804)
Superfamily **ONCIDIACEA**
Family **ONCIDIIDAE**
Oncidium peronii Cuvier, 1805

Class PULMONATA
Superfamily **ACTOPHILA**
Family **ELLOBIIDAE**
Melampus lividus (Deshayes, 1830)
Melampus sp.
Laemodonta (*Laemodonta*) *rapax* (Dhorn, 1859)
Superfamily **PATELLIFORMIA**
Family **SIPHONARIIDAE**
Siphonaria asghar Biggs, 1958
Siphonaria rosea Hubendick, 1943

Class **BIVALVIA**
Superfamily **NUCULACEA**
Family **NUCULIDAE**
Nuculana confusa (Hanley, 1860)
Superfamily **ARCACEA**
Family **ARCIDAE**
Arca (*Acar*) *plicata* Dillwyn, 1817§
Barbatia lacerata Bruguière, 1789
Barbatia nivea Gmelin, 1791*
Arca (*Barbatia*) *fusca* Brugiuère, 1792‡
Anadara antiquata (Linnaeus, 1758)
Anadara ehrenbergi (Dunker, 1868)
Anadara uropigmelana (Bory St. Vincent, 1824)§
Arca (*Scapharca*) *natalensis* Krauss, 1848*
Arca (*Scapharca*) *rufescens* Reeve, 1844*
Scapharca tricenicosta (Nyst, 1848)
Scapharca vellicata (Reeve, 1844)
Trisidos tortuosa (Linnaeus, 1758)
Family **GLYCYMERIDAE**
Glycymeris hoylei Melvill and Standen, 1899
Glycymeris lividus (Reeve, 1843)
Glycymeris pectunculus (Linnaeus, 1758)
Glycymeris striatularis (Lamarck, 1819)
Glycymeris (*Pectunculus*) *nodosus* (Reeve, 1843)‡
Glycymeris (*Pectunculus*) *pectiniformis* (Lamarck, 1819)‡
Glycymeris (*Glycymeris*) *taylori* (Angas, 1879)‡

Superfamily **MYTILACEA**
Crenella adamsiana Melvill and Standen, 1907
Modiolus rhomboideus (Reeve, 1857)
Brachidontes (*Hormomya*) *variabilis* (Krauss, 1848)
Septifer bilocularis (Linnaeus, 1758)
Lithophaga lithophaga (Linnaeus, 1758)

Superfamily **PTERIACEA**
Family **ISOGNOMONTIDAE**
Isognomon ephippium (Linnaeus, 1758)
Isognomon legumen (Gmelin, 1791)
Isognomon dentifer (Krauss, 1848)
Malleus regula (Forsskål, 1775)

Family **PTERIIDAE**
Pteria (*Pinctada*) *inflata* (Schumacher, 1817)‡
Pinctada margaratifera (Linnaeus, 1758)
Pinctida radiata (Leach, 1814)
Pinctada sp.

Family **PINNIDAE**
Pinna atropurpurea Sowerby *mutica* Reeve, 1858
Pinna bicolor Gmelin, 1791

Superfamily **PECTINACEA**
Family **PECTINIDAE**
Plicatula plicata (Linnaeus, 1767)
Chlamys ruschenbergerii (Tryon, 1870)
Spondylus exilis Sowerby, 1895
Spondylus foliacus Chemnitz, 1784‡
Spondylus gloriandus Melvill, 1907*
Pecten (*Vola*) *dorothea* Melvill, 1907*
Pecten (*Chlamys*) *senatorius* Gmelin, 1790‡

Family **LIMIDAE**
Lima squamosa Lamarck, 1801*
Lima (*Lima*) *tenuis* (H. Adams, 1870)
Lima (*Limatula*) *leptocarya* Melvill, 1898

Superfamily **OSTREACEA**
Family **OSTREIDAE**
Crassostrea cucullata (Born, 1778)
Ostrea (*Lopha*) *cristagalli* Linnaeus, 1758‡

Superfamily **ASTARTACEA**
Family **CRASSATELLIDAE**
Cuna coxi Eames and Wilkins, 1957
Cuna majeeda n.sp.
Cuna sp.

Superfamily **CARDITACEA**
Family **CARDITIDAE**
Cardita antiquata Linnaeus*
Cardita (*Cardita*) *bicolor* Lamarck, 1819‡
Cardita echinaria Melvill, ...*
Cardita ffinchi (Melvill, 1898)

Family **TRAPEZIIDAE**
Trapezium sublaevigatum (Lamarck, 1819)

Superfamily **CRASSATELLACEA**
Family **CRASSATELLIDAE**
Crassatella indica Smith, 1895*

Superfamily **LUCINACEA**
Family **UNGULINIDAE**
Diplodonta ravayensis Sturany, 1901

Family **LUCINIDAE**
Divaricella cumingi (Adams and Angus, 1863)
Ctena divergens (Philippi, 1850)
Codakia (*Jagonia*) *fibula* (Reeve, 1850)‡
Codakia (*Jagonia*) *fischeriana* (Issel, 1869)
Anodontia edentula (Linnaeus, 1758)
Phacoides (*Bellucina*) *semperianus* (Issel, 1869)

Superfamily **CHAMACEA**
Family **CHAMIDAE**
Chama brassica Reeve, 1847

Superfamily **CARDIACEA**
Family **CARDIIDAE**
Laevicardium papyraceum (Bruguière, 1789)
Laevicardium (*Trachycardium*) *flavum* (Linnaeus, 1758)‡
Laevicardium (*Trachycardium*) *unicolor* (Sowerby, 1841)‡
Trachycardium lacunosum (Reeve, 1845)
Trachycardium maculosum (Wood, 1815)
Cardium (*Trachycardium*) *vertebratum* Jonas, 1844*
Parvicardium succiensis (Issel, 1869)

Superfamily **VENERACEA**
Family **VENERIDAE**
Lioconcha callipygia (Born, 1778)‡
Lioconcha picta (Lamarck, 1818)
Gafrarium arabicum (Lamarck, 1818)
Gafrarium dispar (Dillwyn, 1817)
Gafrarium pectinatum (Linnaeus, 1758)

Gafrarium (*Circe*) *lenticulare* (Deshayes, 1853)‡
Circe (*Circe*) *intermedia* Reeve, 1863
Circe (*Circe*) *scripta* (Linnaeus, 1758)§
Circe (*Parmulophora*) *corrugata* (Dillwyn, 1817)
Dosinia alta (Dunker, 1848)
Dosinia hepatica (Lamarck, 1818)
Dosinia histrio (Gmelin, 1791)‡
Dosinia sp.
Dosinia (*Dosinida*) *contracta* Philippi, 1845‡
Dosinia (*Dosinida*) *laminata* Reeve, 1850)‡
Venus (*Chione*) *lilacina* Lamarck,‡
Chione lamarcki Gray, 1843*
Chione trigona (Reeve, 1863)‡
Amiantis erycina (Linnaeus, 1758)
Amiantis hagenowi (Dunker, 1844)‡
Sunetta effosa Hanley, 1842
Sunetta meroe (Linnaeus, 1758)*
Sunetta sp.
Sunetta (*Sunetta*) *scripta* (Linnaeus, 1758)‡
Meretrix meretrix (Linnaeus, 1758)
Tivela ponderosa Koch in Philippi, 1844
Bassina calophylla Hanley†
Timoclea farsiana n. sp.
Katelysia marmorata (Lamarck, 1818)
Irus irus (Linnaeus, 1758)

Superfamily **MACTRACEA**
Family **MACTRIDAE**
Mactra olorina Philippi, 1846
Mactra (*Mactra*) *grandis* Gmelin, 1791‡
Mactra (*Mactra*) *lilacina jickelii* Weinkauff, 1881‡

Superfamily **TELLINACEA**
Family **PSAMOBIIDAE**
Asaphis deflorata (Linnaeus, 1758)§
Solecurtus australis Dunker, 1861

Family **TELLINIDAE**
Tellina (*Arcopaginula*) *inflata* Gmelin, 1791
Tellina (*Arcopagia*) *isseli* (A. Adams, 1870)
Tellina (*Pistris*) *pristis* Lamarck, 1818
Tellina (*Pinguitellina*) *robusta* Hanley, 1844
Angulus (*Homala*) *triradiatus* H. Adams, 1870‡
Exotica (*Jacetellina*) *rhomboides* (Quoy and Gaimard, 1835)
Macoma arsinoensis (Issel, 1869)
Macoma jeanae Dance and Eames, 1966
Tellidora pellyana H. Adams, 1873

Superfamily **SOLENACEA**
Family **SOLENIDAE**
Cultellus cultellus (Linnaeus, 1758)

Superfamily **MYACEA**
Family **CORBULIDAE**
Corbula acutangulata Issel, 1869
Corbula modesta Hinds, 1843
Corbula subquadrata Melvill, 1907

Superfamily **GASTROCHAENACEA**
Family **GASTROCHAENIDAE**
Gastrochaena cuneiformis Spengler, 1783

STATION LIST

Station No.	Locality	Habitat
	'Al Ghazal' Stations dredged by G. Evans	
1	5 m S.W. of Jazirat az Zarqa.	60 ft sandy bottom.
2	2½ m N.E. of Oil Company's jetty.	49 ft sandy with plant fragments.
3	2½ m N.E. of Oil Company's jetty.	39–43 ft sandy, some weed coated friable rock.
4	3 m E. of Jazirat al Yas.	70 ft sandy bottom.
5	3 m E. of Jazirat al Yas.	70 ft muddy sand.
6	3 m E. of Jazirat al Yas.	44–74 ft sandy, no rock, algal covered, shells.
7	3 m E. of Jazirat al Yas.	51–64 ft sandy, no rock, many echinoids.

STATION LIST—'Al Ghazal' Stations dredged by G. Evans—*cont.*

Station No.	Locality	Habitat
8	2 m N.E. of Jazirat al Yas.	50–60 ft sandy, small fragments of rock.
9	3 m N. of Jazirat al Yas.	54–70 ft many rock fragments with dead brain coral and staghorn coral, many echinoids.
10	4 m N. of Jazirat al Yas.	50–88 ft rock exposed on bottom.
11	4 m N. of Jazirat al Yas.	70 ft sandy.
12	7 m E. of Jazirat al Dalma.	115 ft sandy
13	16 m N.E. of Jazirat al Dalma.	50–60 ft sandy, small amounts of rock.
14	20 m N.E. of Jazirat al Dalma.	50–60 ft sandy, small amounts of rock.
15	21¼ m N.E. of Jazirat al Dalma.	50–60 ft sandy, small amounts of rock.

Halat al Bahrani Stations collected by G. Evans

16	near Lagoon N.W. Halat al Bahrani.	Beach.
17	N.W. Halat al Bahrani.	Dune flat.
18	N.W. Halat al Bahrani.	Spit.
19	S.W. Halat al Bahrani.	Beach.
20	—	Shell concentrate at base of beach.
21	½ m off N.E. Halat al Bahrani.	Beach.
22	S.E. Halat al Bahrani.	Flat hummocky beach.
23	—	Flat hummocky beach.
24	Inland, S.E. Halat al Bahrani.	Edge of upper beach.
25		Flat beach.
26	Jazirat Sir Abu Nu'air.	Beach.
27 to 30	Halat al Bahrani.	Low tide terrace.

Stations collected by G. Evans and J. Kinsman

31, 32	E. side of Halat al Bahrani.	Shoreline, center of Lagoon.
33	—	
34, 35	S. side of Halat al Bahrani.	Shoreline.
36	N.E. of Halat al Bahrani.	Shoreline.
37	½ m N.W. of Halat al Bahrani.	Coral patch on small bank at mouth of Abu Dhabi channel.
38	½ m off Jazirat al Futaysi.	Outer lagoon.
39	½ m W. of Jazirat al Futaysi.	Outer lagoon.
40	N. side of Halat al Bahrani.	Small lagoon, protected by sand pit.
41	N. side of Halat al Bahrani.	Beach face.
42	1¾ m off N.W. coast of Halat al Bahrani.	10 ft on slope in front of tidal delta.
43	2¾ m off N.E. corner of Halat al Bahrani.	Nearshore shelf.
44	N. of Halat al Bahrani.	Small reef.
45	¼ m off N.W. coast of Halat al Bahrani.	Shallow platform.
46	N. of Jazirat al Futaysi.	Channel.
47	N. of Jazirat al Futaysi.	Coral clumps.
48	N. of Jazirat al Futaysi.	Habitat

STATION LIST—*cont.*

Station No.	Locality	Habitat
	Stations collected by G. Evans Autumn 1962	
49	S.W. Jazirat as Sa'diyat.	Rock platform, low tide covered with veneer of sand.
50	S.W. Jazirat as Sa'diyat.	Beach.
51	S.W. Jazirat as Sa'diyat.	Wind scoured flat behind beach.
52	Abu Dhabai—Jazirat as Sa'diyat lagoon.	Oyster shell concentrate on channel floor at entrance to lagoon.
53	S.W. Jazirat as Sa'diyat.	Intertidal flat just outside lagoon.
54	N.E. Jazirat as Sa'diyat.	Beach face.
55	N. coast Jazirat as Sa'diyat.	Low tide terrace, sandy bottom.
56	Coast of Jazirat as Sa'diyat.	Beach.
57	N.E. Abu Dhabi Island.	Muddy sand, outer intertidal flat.
58	N. coast Jazirat as Sa'diyat.	Shell concentrate on beach face.
59	Abu Dhabi—Jazirat as Sa'diyat lagoon.	Inner lagoon floor, sandy mud overlying rock.
60	Abu Dhabi—Jazirat as Sa'diyat lagoon.	Inner lagoon, floor mud.
61	Abu Dhabi—Jazirat as Sa'diyat lagoon.	Undercut at low tide on small rocky island.
62	Abu Dhabi—Jazirat as Sa'diyat lagoon.	Intertidal flat on inner edge of shallow terrace, mid-lagoon, muddy sand.
63	Abu Dhabi—Jazirat as Sa'diyat lagoon.	Sandy floor overhanging rock of a bank in outer lagoon.
64	Abu Dhabi—Jazirat as Sa'diyat lagoon.	Intertidal flat on inner edge of terrace, muddy sand, mid-lagoon.
65	Abu Dhabi—Jazirat as Sa'diyat lagoon.	Outer lagoon sand patch between coral clumps channel floor.
66	N.E. shore of Abu Dhabi.	Intertidal flat, muddy sand just inside lagoon.
67	Abu Dhabi lagoon.	Intertidal flat, muddy sand on a small island, outer lagoon.
67a	N.E. Abu Dhabi I. on margin of lagoon channel.	10 ft, muddy sand.
68	Abu Dhabi lagoon.	Thick sand overlying rock, shallow terrace, mid-lagoon.
69	Abu Dhabi lagoon.	Shell mound on island in mid-lagoon.
70	Shuweihat, W. coast Jebel Dhanna.	Beach concentrate, open beach.
70a	Sila, foot of Qatar Peninsula.	Beach face.
71, 72	N.E. shore Abu Dhabi I.	Tidal flat, muddy sand.
73	N.E. shore Abu Dhabi I.	Tidal flat, muddy sand, outer lagoon.
74, 75	Trucial coast.	
	Stations collected by D. J. J. Kinsman, Autumn, Winter 1961, *Spring* 1963	
76	E. Halat al Bahrani.	Middle of intertidal zone in outer lagoon channel bank, sandy.
77	E. Halat al Bahrani.	Middle of lower intertidal zone, channel bank, sandy.
78	E. Halat al Bahrani.	Lowermost intertidal zone, channel bank, sandy.
79–85	1 m N. of N.E. Halat al Bahrani; outer lagoon.	Low intertidal zone on oolite shoal.

STATION LIST—Stations collected by G. Evans and J. Kinsman—*cont.*

Station No.	Locality	Habitat
86	N. shore Halat al Bahrani.	Lower intertidal zone; oolite sand substrate.
87	N. shore Halat al Bahrani.	Sub-tidal, oolite sand substrate.
88	1 m N. of Halat al Bahrani.	Intertidal oolite shoal.
89	Unknown	
90–93	N. Jazirat al Fuṭaysi.	Intertidal zone, rocky shore, limestone boulders.
94	¼ m N. of N. Jazirat al Fuṭaysi.	Coral reef.
95	Off N. Jazirat al Fuṭaysi.	Mixed rock and sand bottom, low intertidal zone on channel side.
96	W. coast in mid-lagoon, Jazirat al Fuṭaysi.	Intertidal zone, sandy mud near limestone rocks.
97	1 m off W. Jazirat al Fuṭaysi.	Low intertidal zone, rocky limestone substrate.
98	¾ m N. of N. Jazirat al Fuṭaysi.	Coral reef.
99	N.E. Jazirat al Futaysi, in mid-lagoon.	High intertidal zone, blue-green algal flat, sandy.
100	N. Jazirat al Fuṭaysi.	Intertidal zone, sandy and rocky substrate.
101	¼–½ m off N.E. Jazirat al Fuṭaysi.	Intertidal zone, mid-lagoon, rocky island.
102	¼ m off Batin fishing village, S.W. Abu Dhabi I.	Sub-tidal zone, outer lagoon, oolite sand shoal.
103	Inner lagoon, 2 m S. Jazirat al Fuṭaysi.	Low water mark, muddy sand, some Thalassia.
104	1 m S.W. of Halat al Bahrani.	Limestone from surface of oolite shoal, sub-tidal.
105	Abu Dhabi—Jazirat as Sa'diyat lagoon.	Shallow water.

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